Brief Academic Profile of Dr. Anil Kumar, Indian Institute of Technology Roorkee

1. Name and full correspondence address Dr. Anil Kumar, FRSC, FNASc
Dept. of Chemistry, IIT
Roorkee, Roorkee -247667,
Uttarakhand

Present Designation Professor **(Emeritus Fellow)**

2. Email(s) and contact number(s) anil.kumar@cy.iitr.ac.in; akmshfcy@gmail.com

3. Institution Indian Institute of Technology Roorkee

4. Gender (M/F/T) M

5. Category Gen/SC/ST/OBC Gen

6. Whether differently abled (~~Yes~~/No) No

Academic Achievements

7. Academic Administrative Experience:

- **Professor & Head**, Department of Chemistry (May 2013 to February 2016)
  Indian Institute of Technology Roorkee, Roorkee-247667, Uttarakhand, INDIA.

- **Founder Head,** Centre of Excellence - **Nanotechnology** (June 2006 to Dec. 2011),
  Indian Institute of Technology Roorkee, Roorkee-247667, Uttarakhand, INDIA.

8. Professional Recognition/ Award/ Prize/ Fellowship received by the applicant:

A-a. Professional Recognition

S No	Academy Fellowships	Year
1.	**Selected NASI-Senior Scientist Platinum Jubilee Fellow** *The National Academy of Sciences, Allahabad, India*	**2019**
2.	**Fellow** of *Royal Society of Chemistry (FRSC)*	**2018**
3.	**Elected Fellow,** *The National Academy of Sciences, Allahabad, India*	**2003**
4.	**Elected Member** American Chemical Society	**1982**

b. Other Award/Prize/Fellowships

S.No.	Awards/Recognition	Year
1.	**G.B. Pant Institute Chair Professor,** **IIT Roorkee,** Indian Institute of Technology Roorkee, Roorkee	**2018 –2021**
2.	**Bharat Vikas Award – 2017** For outstanding performance in the field of ***"Development of Nanostructured Materials"***, Institute of Self Reliance**,** Bhubaneshwar, Odisha.	**2017**
3.	**Selected for HAG scale by IIT Roorkee**	**2013**
4.	Received **Certificate of Appreciation** by **American Chemical Society** for valuable contribution and dedicated service in the Peer Review of manuscripts submitted to ACS Journals.	**2011**
5.	**Star Performer** Selected for **Academic and Professional Excellence,** Indian Institute of Technology Roorkee, Roorkee	**2003-04** **and** **2004-05**
6.	**First Khosla Research Prize and a Medal** on a Research Paper on "Electronic properties of Q-CdS clusters stabilized by adenine" I.I.T. Roorkee.	**2002**
7.	**Khosla Research Award and a Silver Medal** on a Research Paper, "Photoluminescence of colloidal cadmium sulfide in the presence of aniline - study of the CdS – sensistized photocatalytic reaction"**,** Univ. of Roorkee.	**1993**
8.	**Guest Scientist** Hahn-Meitner-Institut, Berlin, **Germany**	**Feb. 1986 - Feb. 1988** **(~2 Years)**
9.	**CSIR Pool Officer**	**April 1982- June 1983**
10.	**Research Associate** **Radiation Laboratory,** **Univ. of Notre Dame**, Notre Dame, Indiana – 46556, **USA**	**1979 - 1982** **(~3 Years)**
11a.	**Received CSIR** *(New Delhi)* **Fellowships** throughout research career in India as **JRF**	**1973-77**
11b.	**CSIR Postdoctoral Fellow**	**1978-79**

12.	**Received Gold Medal** and a **Certificate** Being Topper in M.Sc., S.D. College, Muzaffarnagar (Meerut University)	**1973**

(B). Recognitions

- **Our innovation** on **"*Nitrogen doped Reduced Graphene Oxide (N-rGO) for High-Performance Supercapacitor*"** contributed by ***Anil Kumar*** *and Sahil Thareja has been* ***identified*** *by the prestigious Confederation of Indian Industry (CII) among the* ***notable*** *innovations from IIT Roorkee during* ***2021***.

- **Ph.D. Thesis *Supervised*:** *"Synthesis of N-Doped Reduced Graphene Oxide and its Nanohybrids as Electrode Material(S) for Electrochemical Applications – An Analysis of the Role of different Aqueous Electrolytes on their Supercapacitive Performance"* by ***Sahil Thareja****, fetched* ***INYAS National Research Excellence Award 2021*** *and among the* ***Best Thesis in Electrochemistry.***

- ***Member of International Scientific Committee,*** *Trombay Symposium on Radiation and Photochemistry-2022, and* ***Chaired a Session in this Prestigious Conference*** *on 12th January 2022.*

- **Delivered an Invited Lecture** as a **Resource Person** in the Orientation Program ***to B.Tech 1st year Students (Freshers)*** as per ***MHRD Guidelines*** at NIT Kurukshetra on *"**Role Of Basic Sciences to The Development of Advanced Technology**"* on 9th August 2019.

- The paper, entitled *"High Performance Symmetric Supercapacitor based on Nitrogen doped Reduced Graphene Oxide"* by Sahil Thareja and **Anil Kumar**, presented by Sahil Thareja won the ***Best Poster Award*** in DAE-BRNS sponsored conference on Electrochemistry in Industry, Health and Environment-2020 ***(EIHE-2020)*** held during *21-25th January 2020, BARC, Mumbai, India*.

- Invited for several conferences abroad and in India as an **Invited Speaker / Organizing Committee Member.**

- The paper, entitled *"Synthesis of Glucose-Mediated Ag-γ- Fe_2O_3 Multifunctional Nanocomposites – A Study of their Catalytic and Antibacterial Activities"* by Mandeep Kaloti, **Anil Kumar** and N.K. Navani, presented by Mandeep Kaloti won the Second-Best ***Poster Award*** in International Conference *on Advanced Materials for Energy, Environment and Health* (ICAM-2016) held during *04-07th March 2016*, IIT Roorkee, Roorkee, India.

- Our paper, entitled *"Viscoelastic Properties of Superparamagnetic 5'-Adenosine Monophosphate Mediated Porous β–FeOOH Hydrogel – Its Loading, and Release Capabilities"* by **Anil Kumar** and Sudhir K. Gupta and presented by Sudhir K. Gupta won the

Best Poster Award in 9th India Japan Bilateral Conference ***(BICON-2014)*** on Advanced Material Science and Engineering.

- **Honorable Guest**, 2nd International Conference & Exhibition on Materials Science and Engineering, October 07-09, ***2013, Las Vegas, USA***.

- **Expert,** Annual Review Committee, Radiation and Photochemistry Division, ***BARC***, Mumbai, **March 2012** and **June 2008.**

- **Member,** Expert Committee, ***CSIR*** (SRF/RA) during **2018** & **2008-10**.

- Two of our research papers on 'Nanotechnology Aspects' have been listed/selected under the **most accessed papers** in the first quarter in ***'Langmuir' (2007)*** and ***'Nanotechnology' (2009).***

- '***Synthesis of Fe_2O_3/Ag Core Shell Nanocomposites'*** by **Anil Kumar** and Aditi Singhal and presented by Ms. Aditi Singhal, won the **Second Poster Prize** in "Nanomaterials and Devices Processing and Applications" *(NADPA 2008)*.

- **Member,** DST (New Delhi), National Management Committee for the National Centre for Ultrafast Processes, Univ. of Madras during ***1999-2003***.

(C). **Professional Activities**:

❖ **Elected Member**, American Chemical Society **(ACS)**, USA (1982); **Member** (2007 onwards contd.).
❖ **Fellow,** Royal Society of Chemistry (RSC), UK, 2018 onwards
❖ **Member**, Mirror Committee on Nanotechnology, Bureau of Indian Standards, New Delhi, 2007 - 2014.
❖ **Member**, **Sigma Xi,** The Scientific Research Society, USA (1981).
❖ **Life Member**, Indian Society for Radiation and Photochemical Sciences **(ISRAPS)**, Mumbai (1999).
❖ **Elected Member**, Life Member, Indian Chemical Society, Kolkata.
❖ **Life Member**, Chemical Research Society of India, Bangalore.
❖ **Life Member**, Indian Association of Solid State Chemists and Allied Scientists **(ISCAS).**

9. Teaching & Research Experience ***(Please see parts A toJ)***

Areas of Academic Interest*:*

Molecular Spectroscopy, Kinetics and Photochemistry, Radiation Chemistry, Nanoscale materials, Chemical Thermodynamics, Surface Chemistry and General Physical Chemistry.

(A). *Teaching Experience* *(Approx. in years)*

Undergraduate	36
Postgraduate	37

We have made several ***innovative contributions to the teaching and research*** in the areas related to Physical Chemistry. In particular, we have developed teaching curriculum on ***kinetics, photo-*** *and* ***radiation chemistry, spectroscopy, nanoscale materials, supramolecular chemistry, thermodynamics, surface chemistry*** *and* ***undergraduate physical chemistry,*** *and* **have been instrumental in developing**

several advanced research facilities at the institute as a ***faculty*** as well as being the **Founder Head, *Centre of Excellence - Nanotechnology*** and **Head, *Department of Chemistry***.

(B) Response Report of the Courses Taught during Autumn 2019- Autumn 2022

UG/PG	Year	Course	No. of Registered Students	Faculty Score
UG	Autumn (2021-22)	CYN-001 (Physical Chemistry)	207	4.37
PG	Autumn (2021-22)	CYN-503 (Thermodynamics, Interfaces & Solids)	34	4.40
UG	Autumn (2020-21)	CYN-001 (Physical Chemistry)	170	3.99
PG	Autumn (2020-21)	CYN-503 (Thermodynamics, Interfaces & Solids)	49	4.24
UG	Spring (2020-21)	CYN-006 (General Chemistry –II)	91	3.66
PG	Spring (2020-21)	CYN-504 (Kinetics & Photochemistry)	48	3.42
PG	Autumn (2019-20)	CYN-629 (Advanced Physical Chemistry)	09	4.02
PG	Autumn (2019-20)	CYN-503 (Thermodynamics, Interfaces & Solids)	42	3.89
PG	Autumn (2019-20)	CYN-511 (Laboratory-I)	21	4.07
UG	Autumn (2019-20)	CYN-001 (General Chemistry –II)	133	3.44
PG	Spring (2019-20)	CYN-508 (Molecular Spectroscopy)	41	4.15
PG	Spring (2019-20)	CYN-504 (Kinetics & Photochemistry)	41	4.26
UG	Spring (2019-20)	CYN-006 (General Chemistry –II)	73	3.67

(C) Research Publications in Journals / Presented in Conferences:

Total number of Publications in SCI Journals: 98

Refereed Journals – Total 99 [**ACS** 21 (02 in **JACS**); **RSC** 24; **Elsevier** 18; **Wiley** 05; **IOP** 03; **Springer** 04; **Taylor & Francis** 01; **Indian Journals** 08; **Others** 15]

Total Citations as per Google Scholar Data (***Excluding Self-Citations***) (Approx.): 1999 (~1*700)***; h-index** 24**; i10-index** 56. Citation Last 05 Years since 2017 (as per Google Scholar data) > 683; **h-index** 14**; i10-index** 22.

Some Highlights of our Research Work

- We have taken several ***research initiatives*** at IIT Roorkee (erstwhile UOR). Some of these also got recognition globally as is reflected by ***citations*** (approx.) of our ***papers*** in: different books ***(35)***; important international journals such as: *Angew. Chem. /Nature – including Scientific Reports and Nature Nanotechnology* ***(12)***; *ACS* ***(>157)***; *RSC* ***(>120)***; Elsevier/Springer/Wiley ***(>560)***; and other journals as well as thesis ***(370)***, excluding *self- citations as per google record*.

- Most of our research work, contributed in India after joining faculty position, is ***primarily carried out*** at UOR/IITR and has authorship(s) with my students (largely with 2 authors).

- Many of our Ph.D. students, willing to visit abroad, got ***fellowship(s)*** in good institutions and after returning back several of them are occupying good ***teaching/scientific*** positions. My first student has held/holding ***key position(s)*** in ***pharma/chemical*** industries.

- Since last 20 years, we have mainly focused on ***greener*** nano-technological approach to ***design new biocompatible materials*** for their ***multifunctional applications***. Our recent ***publications*** and ***research projects*** (ongoing/completed) also reflect these ***objectives***. During about last 5.5 years, *i.e.* from ***(2016*** *to* ***present),*** we have published about 16 papers in ***International Journals*** *of repute* with an ***average impact factor*** of ***> 5.0***, which indicates the **importance of our work in the context of current scientific importance.**

(D). **List** of **Research Papers Published** in the **Area of Nanotechnology/Nanochemistry** (**Note:** *Since 1985 we are mainly working on* ***Nanomaterials*** *related to* ***Energy Applications*** *and publishing this work in fairly high impact journals with an* ***average impact factor of ~ 5.7****).*

Total Paper Published in this Area – 68 Nos.

S. No.	Details of Published Research Paper	Q Ranking of Jouranal as per SJR	Impact Factor (2020)
1.	S. Thareja and **Anil Kumar** *In-situ* Wet Synthesis of N-ZnO/N-rGO Nanohybrids as Electrode Material for High Performance Supercapacitor and Simultaneous Non-Enzymatic Electrochemical Sensing of Ascorbic acid, Dopamine and Uric acid at their Interface **J. Phys. Chem. C, 125, 24837-24848 (2021).**	Q1 **(1.4)**	**4.126**
2.	Atul Kumar, **Anil Kumar** and G.D Varma Ultrafast resistive type γ-Fe_2O_3-rGO nanohybrids based humidity sensor – a respiratory monitoring tool **J. Mater. Chem. C, 9, 8002–8010 (2021).**	Q1 **(1.9)**	**7.393**

3.	S. Thareja and **Anil Kumar** Water-in-salt' electrolyte based high voltage (2.7 V) sustainable symmetric supercapacitor with superb electrochemical performance - an analysis of the role of electrolytic ions in extending the cell voltage. **ACS Sustainable Chem. Eng. 9, 2338-2347 (2021).**	Q1 **(1.878)**	**8.198**
4.	Priyanka and **Anil Kumar** Smart soft supramolecular hybrid hydrogels modulated by Zn^{2+} / Ag NPs with unique multifunctional properties and applications. **Dalton Trans., 49, 15095–15108 (2020).**	Q1 **(0.98)**	**4.390**
5.	Priyanka and **Anil Kumar** Multistimulus-Responsive Supramolecular Hydrogels Derived by *in situ* Coating of Ag Nanoparticles on 5'-CMP-Capped β-FeOOH Binary Nanohybrids with Multifunctional Features and Applications. **ACS Omega 5, 13672-13684 (2020).**	Q1 **(0.78)**	**3.512**
6.	Ajay Kumar, H. Joshi and **Anil Kumar** Remediation of Arsenic by Metal/ Metal Oxide Based Nanocomposites/ Nanohybrids: Contamination Scenario in Groundwater, Practical Challenges, and Future Perspectives. **Separation and Purification Rev. 1-31, (2020); DOI: 10.1080/15422119.2020.1744649**	Q1 **(1.11)**	**5.324**
7.	Sahil Thareja and **Anil Kumar** High Electrochemical Performance of 2.5 V Aqueous Symmetric Supercapacitor based on Nitrogen doped Reduced Graphene Oxide. **Energy Technol.** (Wiley) **1901339 (1 to 11) (2020)**; ***(DOI: 10.1002/ente.201901339).***	Q1 **(0.91)**	**3.33**
8.	**Anil Kumar** and Priyanka Environmentally benign pH-responsive cytidine-5'-monophosphate molecule-mediated akaganeite (5'-CMP-β-FeOOH) soft supramolecular hydrogels induced by the puckering of ribose sugar with efficient loading/release capabilities. ***New J. Chem.*** *43*, 14997-15013 **(2019).**	Q1 **(0.69)**	**3.591**
9.	Komal Gupta and **Anil Kumar** Zn^{2+}/Cd^{2+}-RNA-mediated Intense White-light-emitting Colloidal CdSe Nanostructures in Aqueous Medium – Enhanced Photophysics and Porous Morphology Induced by Conformational Change in RNA. ***J. Mater. Chem. C*, *7*, 692-708 (2019).**	Q1 **(1.9)**	**7.393**
10.	**Anil Kumar** and Komal Gupta Supramolecular Assisted RNA-Templated Fluorescing Colloidal CdSe QDs Organized in Porous Morphology in the Presence of 1,3-Diaminopropane – Study of their Multifunctional Behavior **J. Phys. Chem. C *122,* 7898−7915 (2018).**	Q1 **(1.4)**	**4.126**
11.	M. Kaloti and **Anil Kumar** Sustainable Catalytic Activity of Ag-Coated Chitosan-Capped Fe_2O_3 Superparamagnetic Binary Nanohybrids (Ag--Fe_2O_3@CS) for the Reduction of Environmentally Hazardous Dyes - A Kinetic	Q1 **(0.78)**	**3.512**

	Study of the Operating Mechanism Analyzing Methyl Orange Reduction **ACS Omega, *3* (2), 1529–1545** (**2018**).		
12.	M. Khandelwal and **Anil Kumar** **"**Electrochemical behavior of glycine mediated N-doped reduced graphene oxide" **New J. Chem., *41,* 8333-8340 (2017).**	Q1 **(0.69)**	**3.591**
13.	**Anil Kumar** and Komal Gupta RNA-mediated fluorescent colloidal CdSe nanostructures in aqueous medium - analysis of Cd^{2+} induced folding of RNA associated with morphological transformation (0D to 1D), change in photophysics and selective Hg^{2+} sensing. **J. Mater. Chem. (A), *5,* 6146-6163 (2017).**	Q1 **(3.64)**	**12.732**
14.	S. Firdoz and **Anil Kumar** ZnO nanoparticles and their acarbose-capped nanohybrids as inhibitors for human salivary amylase. ***IET Nanobiotechnol.*, 11 (3), 329-335 (2017).** **doi: 10.1049/iet-nbt.2016.0115**	Q2 **(0.37)**	**1.859**
15.	M. Kaloti and **Anil Kumar** Synthesis of Chitosan-Mediated Silver Coated γ-Fe_2O_3 (Ag-γ-Fe_2O_3@Cs) Superparamagnetic Binary Nanohybrids for Multifunctional Applications **J. Phys. Chem. C *120,* 17627-17644 (2016).**	Q1 **(1.4)**	**4.126**
16.	M. Khandelwal and **Anil Kumar** One-pot environmental friendly amino acid mediated synthesis of N-doped graphene-silver nanocomposites with enhanced multifunctional behavior **Dalton Trans., *45,* 5180-5195 (2016).**	Q1 **(1.05)**	**4.390**
17.	M. Khandelwal and **Anil Kumar** One-step chemically controlled wet synthesis of graphene nanoribbons from graphene oxide for high performance supercapacitor applications **J. Mater. Chem. (A), *3,* 22975-22988 (2015).**	Q1 **(3.64)**	**12.732**
18.	M. Kaloti, **Anil Kumar** and N.K. Navani Synthesis of glucose-mediated Ag - γ-Fe_2O_3 multifunctional nanocomposites in aqueous medium - a kinetic analysis of their catalytic activity for 4-nitrophenol reduction. **Green Chem. *17,* 4786-4799 (2015).**	Q1 **(2.22)**	**10.182**
19.	Umesh Kumar Gaur, **Anil Kumar** and G D Varma Fe-induced morphological transformation of 1-D CuO nanochains to porous nanofibers with enhanced optical, magnetic and ferroelectric properties. **J. Mater. Chem. C, *3,* 4297- 4307 (2015).**	Q1 **(1.9)**	**7.393**

20.	**Anil Kumar,** B. Singh and K. Gupta Photophysical aspects of varying Zn^{2+}/ PbSe nanostructures mediated by RNA leading to the formation of honeycomb-like novel porous morphology. **J. Phys. Chem. (C),** ***119,*** **6314-6323 (2015)**.	Q1 **(1.4)**	**4.126**
21.	**Anil Kumar** and S. K. Gupta Supramolecular–directed novel superparamagnetic 5'-adenosine monophosphate templated β-FeOOH hydrogel with enhanced multi-functional properties. **Green Chem.,** ***17,*** **2524–2537 (2015).**	Q1 **(2.22)**	**10.182**
22.	**Anil Kumar** and M. Khandelwal A novel synthesis of ultra thin graphene sheets for energy storage applications using malonic acid as a reducing agent. **J. Mater. Chem. (A),** ***2,*** **20345–20357 (2014).**	Q1 **(3.64)**	**12.732**
23.	**Anil Kumar** and S.K. Gupta 5'-guanosine monophosphate mediated biocompatible porous hydrogel of β-FeOOH - Viscoelastic behavior, loading and release capabilities of freeze dried gel. **J. Phys. Chem. (B),** ***118,*** **10543-10551 (2014)**.	Q1 **(0.86)**	**2.991**
24.	**Anil Kumar** and V. Kumar Biotemplated inorganic nanostructures: Supramolecular directed nanosystems of semiconductor(s)/metal(s) mediated by nucleic acids and their properties. **Chem. Rev. (ACS),** ***114,*** **7044-7078 (2014).**	Q1 **(20.53)**	**60.622**
25.	**Anil Kumar** and M. Khandelwal Amino acid mediated functionalization and reduction of graphene oxide – synthesis and theformation mechanism of nitrogen-doped graphene**.** **New J. Chem.,** ***38,*** **3457-3467 (2014).**	Q1 **(0.69)**	**3.591**
26.	U. K. Gaur, **Anil Kumar** and G. D. Varma The synthesis of self-assembled 1-D CuO nanochains in aqueous medium and a study of their multifunctional features. **CrystEngComm (RSC),** ***16,*** **3005–3014 (2014).**	Q1 **(0.81)**	**3.545**
27.	**Anil Kumar** and S.K. Gupta Synthesis of 5'-GMP-mediated porous hydrogel containing β - FeOOH nanostructures: optimization of its morphology, optical and magnetic properties. **J. Mater. Chem. (B),** ***1,*** **5818-5830 (2013).**	Q1 **(1.32)**	**6.331**
28.	**Anil Kumar** and B. Singh Optoelectronic properties of dual emitting RNA mediated colloidal PbSe nanostructures. **Dalton Trans.,** ***42,*** **11455–11464 (2013)**.	Q1 **(0.98)**	**4.390**

29	**Anil Kumar** and S.K. Gupta Synthesis of adenine mediated superparamagnetic colloidal β-FeOOH Nanostructure(s) – study of their morphological changes and magnetic behavior. **J. Nanopart. Res. 15:1466, 1-16 (2013) (DOI 10.1007/s11051-013-1466-z).**	Q2 **(0.45)**	**2.253**
30	**Anil Kumar** and B. Singh Zn^{2+} induced folding of RNA to produce honeycomb like RNA - mediated fluorescing Zn^{2+}/PbSe nanostructures. **J. Phys. Chem. (C),** ***117,*** **5386–5396** (**2013**).	Q1 **(1.4)**	**4.189**
31	**Anil Kumar,** V. Chaudhary and Vinit Kumar Synthesis of guanosine 5′-monophosphate (GMP) - mediated Ag/CdS nanohybrids – their self-assembly and optoelectronic properties. **Eur. J. Inorg. Chem. 269-279 (2013).**	Q1 **(0.67)**	**2.529**
32	**Anil Kumar** and B. Singh RNA templated water soluble Mg^{2+}/ PbSe porous nanostructures with dual Fuorescence. **RSC Advances,** ***2,*** **9079–9090 (2012).**	Q1 **(0.75)**	**3.36**
33	**Anil Kumar** and B. Singh Synthesis and photophysics of red emitting RNA templated PbSe nanostructures. **Chem. Commun.,** ***47 (14)*****, 4144 - 4146 (2011).**	Q1 **(1.84)**	**6.222**
34	**Anil Kumar** and A. Singhal Optical, photophysical and magnetic behavior of GMP-templated binary (β - Fe_2O_3/CdS) and ternary (β-Fe_2O_3/Ag/CdS) nanohybrids. **J. Mater. Chem.,** ***21,*** **481-496 (2011).**	Not assigned	**6.101 (Old)**
35	**Anil Kumar** and A. Singhal Optical and magnetic behavior of Ag encapsulated β -Fe_2O_3 core-shell hollow Nanotubes. **Mater. Chem. Phys.** ***131,*** **230-240 (2011).**	**Q2 (0.76)**	**4.094**
36	S. Firdoz, Ma Fang, XiuliYue, Zhifei Dai, **Anil Kumar**, Jiangbin A novel amperometric biosensor based on single walled carbon nanotubes with acetylcholine esterase for the detection of carbaryl pesticide in water. **Talanta,** ***83,*** **269 - 273 (2010).**	Q1 **(1.18)**	**6.057**
37	**Anil Kumar** and V. Kumar Synthesis and optical properties of Guanosine 5′-monophosphate - mediated CdS nanostructures: An analysis of their structure, morphology and electronic properties. **Inorg. Chem.,** ***48,*** **11032-11038 (2009).**	Q1 **(1.35)**	**5.165**

38.	**Anil Kumar,** A. Jakhmola and V. Chaudhary Synthesis and photophysics of colloidal ZnS/PbS/ZnS nanocomposites - an analysis of dynamics of charge carriers. **J. Photochem. Photobiol. A: Chem.** ***208,*** **195-202 (2009).**	Q1 **(0.71)**	**3.306**
39.	**Anil Kumar** and V. Kumar Supramolecular – directed synthesis of RNA-mediated CdS/ZnS nanotubes. **Chem. Commun., 5433-5435 (2009).**	Q1 **(1.84)**	**6.222**
40.	**Anil Kumar** and A. Singhal Synthesis of colloidal silver iron oxide nanoparticles – study of their optical and magnetic behavior. **Nanotechnology,** ***20,*** **295606-295616 (2009).**	Q1 **(0.93)**	**3.874**
41.	**Anil Kumar** and A. Jakhmola RNA-templated fluorescent Zn/PbS (PbS + Zn^{2+}) supernanostructures. **J. Phys. Chem. (C),** ***113,*** **9553-9559 (2009).**	Q1 **(1.4)**	**4.126**
42.	**Anil Kumar** and V. Chaudhary Time resolved emission studies of Ag-adenine-templated CdS (Ag/CdS) nanohybrids. **Nanotechnology,** ***20,*** **095703 - 095712 (2009).**	Q1 **(0.93)**	**3.874**
43.	**Anil Kumar** and V. Kumar Self-assemblies from RNA-templated colloidal CdS nanostructures. **J. Phys. Chem. (C),** ***112,*** **3633-3640 (2008).**	Q1 **(1.4)**	**4.126**
44.	**Anil Kumar** and A. Singhal Synthesis of colloidal β-Fe_2O_3 nanostructures - influence of addition of Co^{2+} on their morphology and magnetic behavior. **Nanotechnology,** ***18,*** **475703-475710 (2007).**	Q1 **(0.93)**	**3.874**
45.	**Anil Kumar** and V. Chaudhary Optical and photophysical properties of Ag/CdS nanocomposites – an analysis of relaxation of charge carries. **J. Photochem. Photobiol. A: Chem.** ***189,*** **272-279 (2007).**	Q1 **(0.71)**	**3.306**
46.	**Anil Kumar** and A. Jakhmola RNA – mediated fluorescent Q-PbS nanoparticles. **Langmuir (Lett.) 23, 2915-2918 (2007).**	Q1 **(1.04)**	**3.882**
47.	**Anil Kumar** and N. Mathur Photocatalytic degradation of aniline at the interface of TiO_2 suspensions containing carbonate ions. **J. Colloid Interface Sci.** ***300,*** **244-252 (2006).**	Q1 **(1.54)**	**8.128**

48.	**Anil Kumar** and A. Jakhmola Photophysics and charge dynamics of Q-PbS based mixed ZnS/PbS and PbS/ZnS semiconductor nanoparticles. **J. Colloid Interface Sci. *297,* 607-617 (2006).**	Q1 **(1.54)**	**8.128**
49.	**Anil Kumar** Physicochemical and photochemical properties of nanoscale semiconductors - dynamics of the charge carriers. **Natl. Acad. Sci. Lett., *28,* 1-11 (2005). (Published as a Lead Article)**	**Q3 (0.21)**	**0.416**
50.	**Anil Kumar** and N. Mathur Photocatalytic oxidation of aniline using Ag^{+}-loaded TiO_2 suspensions. **Appl. Catal. A: Gen. 275,189-197 (2004).**	Q1 **(1.27)**	**5.006**
51.	**Anil Kumar** and S. Mital Electronic and photocatalytic properties of purine(s)-capped Q-CdS nanoparticles in the presence of tryptophol. **J. Mol. Catal. A: Chem. *219,* 65-71 (2004).**	NA	**3.687**
52.	**Anil Kumar** and S. Mital Synthesis and photophysics of 6-dimethylaminopurine-capped Q-CdS nanoparticles – astudy of its photocatalytic behavior. **Int. J. Photoenerg. *6(2),* 61-68 (2004).**	**Q2 (0.43)**	**2.113**
53.	**Anil Kumar** and S. Mital Photophysics and photocatalytic behavior of composite CdS-purine nanoparticles in the presence of certain indoles. **J. Colloid Interface Sci. *265,* 432-438 (2003).**	Q1 **(1.54)**	**8.128**
54.	**Anil Kumar** and A.K. Jain Photophysics and photocatalytic properties of Ag^{+} - doped composite ($CdS-TiO_2$) colloidal semiconductor. **J. Photochem. Photobiol. A: Chem. *156,* 207-218 (2003).**	Q1 **(0.71)**	**3.306**
55.	**Anil Kumar** and S. Mital Synthesis and photophysics of purine-capped Q-CdSnanocrystallites. **Photochem. Photobiol. Sci. *1,* 737-741 (2002).**	Q2 **(0.7)**	**2.831**
56.	**Anil Kumar** and S. Mital Electronic properties of Q-CdS clusters stabilized by adenine. **J. Colloid Interface Sci. *240,* 459-466 (2001).**	Q1 **(1.54)**	**8.128**

57.	**Anil Kumar** and D.P.S. Negi Photophysics and photocatalytic properties of $Cd(OH)_2$ -coated Q-CdS clusters in the presence of guanine and related compounds. **J. Colloid Interface Sci. *238,* 310-317 (2001).**	Q1 **(1.54)**	**8.128**
58.	**Anil Kumar** and A. K. Jain Photophysics and photochemistry of colloidal CdS-TiO_2 coupled semiconductors - Photocatalytic oxidation of indole. **J. Mol. Catal. A: Chem. *165,* 267-275 (2001).**	NA	**3.687**
59.	**Anil Kumar** and D.P.S. Negi Photocatalytic and photophysical behaviours of $Cd(OH)_2$ - coated Q-CdS in the presence of tryptophan. **J. Photochem. Photobiol. A: Chem., *134,* 199-207 (2000).**	Q1 **(0.71)**	**3.306**
60.	**Anil Kumar** and A. Kumari Photocatalytic oxidative C-C bond cleavage of 1,2-ethanediol initiated by aqueous titanium dioxide dispersion - influence of Ag^+ on the catalytic activity. **Res. Chem. Intermed., *25,* 695-708 (1999).**	Q2 **(0.42)**	**2.262**
61.	**Anil Kumar** and S. Kumar Colloidal CdS induced photocatalytic reaction of 2-methylindole - mechanistic analysis of oxidation of indoles. **J. Phys. Org. Chem. *11,* 277-282 (1998).**	Q3 **(0.33)**	**2.391**
62.	**Anil Kumar,** S. Kumar and D.P.S. Negi Photocatalytic oxidative C-C bond cleavage of the pyrrole ring in 3-methylindole induced by colloidal CdS particles. **J. Chem. Res. (S), *1,* 54-55 (1998).**	-	**0.67 RSC Journal (Old)**
63.	**Anil Kumar** and S. Kumar Catalytic effect of Ag^+ in colloidal CdS- induced photooxidation of aniline. **Chem. Lett. (8), 711-712 (1996).**	Q2 **(0.49)**	**1.389**
64.	**Anil Kumar** and S. Kumar Enhancement of luminescence of CdS in presence of indoles - study of CdS - sensitized reaction of indole. **J. Photochem. Photobiol. A: Chem., *83,* 251-256 (1994).**	Q1 **(0.71)**	**3.306**
65.	**Anil Kumar** and S. Kumar Photoluminescence of colloidal cadmium sulfide in the presence of aniline - study of the CdS - sensistizedphotocataytic reaction. **J. Photochem. Photobiol. A: Chem. 69, 91-95 (1992).**	Q1 **(0.71)**	**3.306**
66.	**Anil Kumar** Photoinduced processes in colloidal semiconductors – physicochemical properties and applications. **Bull. Indian Soc. Rad. and Photochem. Sci. *3(1),* 2-5 (1992).**	-	**-**

67.	**Anil Kumar,** A. Henglein and H. Weller Photochemistry and radiation chemistry of semiconductor colloids - preparation of colloidal PbO_2 and various electron transfer processes. **J. Phys. Chem.** ***93,*** **2262-2266 (1989).**	NA	**ACS Journal (Old)**
68.	**Anil Kumar,** E. Janata and A. Henglein Photochemistry of colloidal semiconductors - quenching of CdS fluorescence by excess positive holes. **J. Phys. Chem.** ***92,*** **2587-2591 (1988).**	NA	**ACS Journal (Old)**
69.	A. Henglein, **Anil Kumar,** E. Janata and H. Weller Photochemistry and radiation chemistry of semiconductor colloids - reaction of the hydrated electron with CdS and non-linear optical effects. **Chem. Phys. Lett.** ***132*****, 133-136 (1986).**	**Q2 (0.51)**	**2.31**

(E). Patents: Patent granted: **02**; Patents filed **- 01**

S.No.	Title
(i).	**Anil Kumar** and Sahil Thareja A Method for Synthesis of Nitrogen-Doped Reduced Graphene Oxide (N-rGO) for High Performance Supercapacitor **Granted -** ***Indian patent No. 391742 on 11th March 2022 (application No.201811031021)***
(ii).	Himanshu Joshi, **Anil Kumar,** Ajay Kumar Synthesis of iron oxide nanohybrids (maghemite phase) employing raw spent wash from distillery industry as a precursor material." ***Granted - Indian Patent No. 340010 on 30th June 2020.***
(iii).	Atul Kumar, **Anil Kumar** and G.D. Varma An Ultrafast Resistive Type Humidity Sensor Based on Nanohybrids Filing of **Complete Specification** ***(Indian Patent application no. 202011007304*** dated**. 20/02/2020)/Published on 11th June 2021.**

(F). Sponsored Research Projects: 8 Nos. as ***P.I.* + 1** ***Departmental Project*** *at* ***S.No. 7, worked as P.I. in one of the areas. Handled, Contributed & Defended one*** *of the* ***Identified Thrust Area in this Project;*** **Total Projects = 9**

S. No.	Title	Sponsoring Agency	Amount (in Lakh)	Duration	Completed /Ongoing	Co-P.I. - if any
1	Synthesis of Biotemplated Colloidal Nano-structures of Iron Oxide(s) - Analysis of Correlation between	**CSIR**, New Delhi	~17.0 *(Receipt 15.5)*	July, 2014 to July, 2017 (**Note:** Last	Completed in **2018** (Report submitted **2019)**	None

	their Morphologies and Properties			instalment received in **2018)**		
2	Synthesis of Nanohybrids of Colloidal Semiconductor Oxides – An Analysis of their Charge Dynamics, Electronic and Magnetic Properties	**CSIR**, New Delhi	14.2	August, 2008- August, 2011 (3 Years)	Completed	None
3	Synthesis and Photochemistry of Composite Metal Semiconductor Nanostructured Materials	**DST** (Nanomission), New Delhi	15.8	Nov., 2004- March, 2008	Completed	None
4	Analysis of Electronic Properties of Nanoclusters of Semiconductors – Development of Semiconductor Based Integrated Photocatalytic Systems	**DST**, New Delhi	21.0	August, 2001- August, 2005	Completed	None
5	Coupled Semiconductors as Catalysts for Initiating Photochemical Reactions - Mechanistic Investigations of their Photochemical and Photophysical Behaviour	**DST**, New Delhi	14.5	June, 1995 – March, 2000	Completed	None
6	Preparation of Silver (III) Species and its Stable Complexes-A Kinetic Investigation of their Redox and Photoredox Reactivity	**CSIR**, New Delhi	4.6	1995-1998 (3 Years)	Completed	Dr. P. Ramamurthy, Univ. of Madras
7	Photo- and Radiation Induced Chemical Reactions	**DRS (UGC)**	35.0 (a part of the funds	1995-1999	Completed	***Handled & contributed work in this***

	(one of the identified thrust areas)		were allotted for this work)			***thrust area as PI***
8	Optimization of photophysics of Nanosized Semiconductor for their Application as Chemical Sensors	**UGC**, New Delhi, **1993** *(Granted by Univ. of Roorkee)*	0.25	1993	Completed	None
9	Catalytic Action of Semiconductor Microelectrodes in Photionduced Chemical Reactions	**DST**, New Delhi	9.9	Feb., 1989-March, 1994	Completed	None

(G). Book Chapters Contributed – 02:

S.No.	**Title of Book Chapter with Reference**
(i).	V. Kumar and **Anil Kumar, RNA-Mediated CdS-Based Nanostructures** Luc Ponchon (ed.)**,** *RNA Scaffolds: Methods and Protocols*, Methods in Molecular Biology**,** Springer Science+Business Media, New York **Ch. 16, vol. 1316, P. 195-210 (2015).**
(ii).	S.P. Srivastava and **Anil Kumar, Kinetics and mechanism of Ag^+ - catalysed oxidation of diols with terminal hydroxyl groups by peroxydisulphate ion**, M. Tsutsui (ed.)**,** Fundamental Research in Homogeneous Catalysis, Plenum Publishing Co., New York, **Vol. 3, 373-396 (1979).**

(H). Details of Ph.D. Theses Supervised: Completed (22) + In progress (02). During last 3 years Ph.D. awarded (04)

S.No.	**Name of Student/Supervisor Year of Award /Submitted**	**Title of Ph.D. Thesis**
1.	Dr. Sahil Thareja **Supervisor: Dr. Anil Kumar** 2021-2022 (Ph.D. awarded in 2021)	"Synthesis of N-Doped Reduced Graphene Oxide and its Nanohybrids as Electrode Material(S) for Electrochemical Applications - An Analysis of the Role of Different Aqueous Electrolytes on their Supercapacitive Performance"
2.	Dr. Priyanka **Supervisor: Dr. Anil Kumar** 2020-2021 (Ph.D. awarded in 2020)	"Synthesis of Multistimulus-Responsive Cytidine-5'-Monophosphate Molecule - Mediated Smart Supramolecular Nanohybrid Hydrogels - Their Multifunctional Features and Applications"

3.	Dr. Komal Gupta **Supervisor: Dr. Anil Kumar** 2019-2020 (Ph.D. awarded in 2019)	"Study of RNA-Mediated Fluorescing Colloidal CdSe Nanostructures – Enhanced Photophysics and Morphological Transformation Induced By Conformational Change in RNA"
4.	Dr. Ajay Kumar **Supervisor:** Dr. Himanshu Joshi **& Dr. Anil Kumar** 2018-2019 (Ph.D. awarded in 2019)	"Arsenic Removal in Groundwater using Engineered Maghemite (γ-Fe_2O_3) Nanoparticles"
5.	Dr. Mandeep Kaloti **Supervisor: Dr. Anil Kumar** and Dr. N. Navani (2018)	"Synthesis and Multifunctional Applications of Biomolecule-Mediated Ag-γFe_2O_3 Nanocomposites"
6.	Dr. Mahima Khandelwal **Supervisor: Dr. Anil Kumar** and Dr. R. Nath (2017-18)	"Study on Chemical Reduction of Graphene Oxide into Graphene – their Physicochemical Behavior"
7.	Dr. Umesh Kumar Gaur **Supervisor:** Dr. G.D. Varma and **Dr. Anil Kumar (**2017-18)	"Synthesis of Pure and Doped CuO Nanostructures and their Multifunctional Properties"
8.	Dr. Sudhir Kumar Gupta **Supervisor: Dr. Anil Kumar (**2015-16)	"Synthesis and Physicochemical Properties of Biotemplated β-FeOOH Nanostructures"
9.	Dr. Bhupender Singh **Supervisor: Dr. Anil Kumar (**2014-15)	"Synthesis and Photophysics of RNA-Mediated Colloidal PbSe Nanostructures"
10.	Dr. Aditi Singhal **Supervisor: Dr. Anil Kumar (**2010-2011)	"Synthesis of β – Fe_2O_3 Based Nanostructures - Study of their optical and Magnetic Properties"
11.	Dr. Vinit Kumar **Supervisor: Dr. Anil Kumar (**2010-2011)	"Synthesis, Optical and Electronic Properties of RNA – Mediated Colloidal CdS Nanostructures"
12.	Dr. Vidhi Chaudhary **Supervisor: Dr. Anil Kumar (**2009-2010)	"Synthesis of Ag/CdS Nanocomposites-An Analysis of their Optical and Photophysical Behavior"

13.	Dr. Anshuman Jakhmola **Supervisor: Dr. Anil Kumar** (2007-2008)	"Synthesis and Phtophysics of Q-PbS Based Colloidal Nanostructures"
14.	Dr. Nupur Mathur **Supervisor: Dr. Anil Kumar** (2005-2006)	"Photocatalytic Action of Certain Anilines Mediated by Aqueous TiO_2 Suspensions"
15.	Dr. Shipra Mital **Supervisor: Dr. Anil Kumar** (2003-2004)	"Synthesis, Photophysics and Photocatalytic Action of Surface-Capped Q-CdS Particles"
16.	Dr. Priyanka Gupta **Supervisor:** Dr. R. N. Goyal **and Dr. Anil Kumar** (2001-2002)	"Oxidation Chemistry of Some Biologically Important N-Heterocyclic Compounds"
17.	Dr. Vaishali **Supervisor: Dr. Anil Kumar** (2001-2002)	"Kinetics of Oxidation of Some Amines, Aminoalcohols and diols by Diperiodatoargentate (III)"
18.	Dr. Arvind Kumar Jain **Supervisor: Dr. Anil Kumar** (2001-2002)	"Photophysics and Photocatalytic Behavior of Q-CdS-TiO_2 in the Presence of Certain Aromatics"
19.	Dr. Devendra Pal Singh Negi **Supervisor: Dr. Anil Kumar** (2000-2001)	"Photophysical and Photocatalytic Behaviors of Q-CdS in the Presence of Some Heterocycles"
20.	Dr. Paresh Kumar **Supervisor: Dr. Anil Kumar** and Dr. R.D. Kaushik (1998-1999)	"Kinetics and Mechanism of Oxidation of Certain Amino Acids by Bis (periodato) Argentate (III)"
21.	Dr. Sanjay Kumar **Supervisor: Dr. Anil Kumar** (1995-1996)	"Photoluminescence of Colloidal Cadmium Sulphide Particles in the Presence of Certain Anilines and Indoles – Study of CdS Sensitized Photocatalytic Reactions"

22.	Dr. Ashok Panwar **Supervisor: Dr. Anil Kumar** (1993-1994)	"Preparation of Tetrahydroxoargentate (III) ion and Study of its Reactions with Certain Aromatic Amines"

(I). Book Chapters Contributed – 02:

S.No.	**Title of Book Chapter with Reference**
(i).	V. Kumar and **Anil Kumar** **RNA-Mediated CdS-Based Nanostructures** Luc Ponchon (ed.)**,** *RNA Scaffolds: Methods and Protocols*, Methods in Molecular Biology**,** Springer Science+Business Media, New York **Ch. 16, vol. 1316, P. 195-210 (2015).**
(ii).	S.P. Srivastava and **Anil Kumar, Kinetics and mechanism of Ag^{+} -catalysed oxidation of diols with terminal hydroxyl groups by peroxydisulphate ion**, M. Tsutsui (ed.)**,** Fundamental Research in Homogeneous Catalysis, Plenum Publishing Co., New York, **Vol. 3, 373-396 (1979).**

(J). Conferences: Proceedings 03 (S. Nos. 32, 42 & 66) + **88** (Abstracted)/Invited Talks/Symp./Meetings. **Total = 92;** Last 03 Years **-14 Nos.**

S. No.	**Author(s)**	**Title**	**Name of Conference/ Meeting**	**Page No. (Other Details)**	**Date & Year**	**Conference Venue**
1.	<u>Ikrar Ahmad</u> and **Anil Kumar**	Synthesis of Cytidine Monophosphate-Assisted Reduced Graphene Oxide (N, P-rGO) as Electrode Material for Supercapacitor Applications	35^{th} International Conf. on Nanomaterials and Nanotech-nology	-	March 25-26, 2022	Berlin, Germany Held Virtually
2.	**Anil Kumar**	Nanotechnology Revolutionizing Societal Applications	National Webinar on Advancement in Modern Experimental Chemistry	Invited Talk as a Resourc e Person	26^{th} Oct. 2021	GGNK College, Ludhiana, Held Virtually

3.	**Anil Kumar**	Fabrication of Sustainable Advanced Greener Nanomaterials Employing Wet Chemical Approach	International Conference on Advanced Materials for Next Generation Applications	Invited Talk	29th to 30th Sept., 2021	Galgotias Univ., Noida Held Virtually
4.	S. Thareja and **Anil Kumar**	One-pot Greener Synthesis of N-doped Reduced Graphene Oxide for High Performance Symmetric Supercapacitor - An Analysis of the Role of Different Electrolytes for Achieving High Electrochemical Potential Window	International Conference on Advanced Materials for Better Tomorrow	Oral	13-17 July, 2021	IIT (BHU) Held Virtually
5.	S. Thareja and **Anil Kumar**	Synergistic Effect of Electrode Material and Electrolyte for Developing High Cell Voltage Aqueous Symmetric Supercapacitor	International Conference on Recent Advances in Chemical Sciences (ICRACS2021)	Oral	14-16 July, 2021.	Depart. of Chemistry, JC Bose University of Science and Technol., YMCA, Faridabad
6.	A. Kumar, G.D. Varma, and **Anil Kumar**	Reduced graphene oxide/Magnetite (rGO-Fe_3O_4) nanohybrids based selective room temperature H_2S gas sensor	American Physical Society (APS) March Meeting 2021	Poster	March 15–19, 2021	Held Virtually
7.	**Anil Kumar**	Greener Protocols for the Fabrication of Biotemplated Nanostructures - their Multifunctional Applications	Continuing Education Programme on 'Environment and Nanosafety'	Invited Talk	17th to 19th Feb 2020	DRDO, Delhi

8.	Sahil Thareja and **Anil Kumar**	High Performance Symmetric Supercapacitor based on Nitrogen doped Reduced Graphene Oxide	DAE-BRNS sponsored conference on Electrochemistry in Industry, Health and Environment-2020	PP-161	21-25 Jan., 2020	BARC, Mumbai
9.	**Anil Kumar**	Environmentally Benign Greener Nanostructures for Certain Energy Applications	National Academies Lecture Workshop on " Materials Engineering for Sustainable Environment and Energy"	Invited Talk	10^{th} Jan., 2020	CSIR-CSIO, Chandigarh
10	**Anil Kumar**	Engineering of Nanostructured Materials for Some Light - Induced Energy Applications	National Academies lecture Workshop on " Materials Engineering for Sustainable Environment and Energy"	Invited Talk	9^{th} Jan., 2020	CSIR-CSIO, Chandigarh
11	S. Thareja and **Anil Kumar**	Synthesis and characterization of nitrogen doped reduced graphene oxide as high-performance binder-free supercapacitor electrode material	International Conference on Supercapacitor, Energy Storage & Application (ICSEA 2019)	Poster	8-10 March, 2019	C-MET, Thrissur, Kerala
12	A. Kumar, G.D. Varma, and **Anil Kumar**	Selective Enhanced H_2S Sensing Using Rgo-Fe_3O_4 Nanohybrids	3^{rd} International Conf. on Condensed Matter & Amp; Applied Physics-2019	Poster	Oct. 14-15, 2019	Govt. Engineering College Bikaner, Rajasthan
13	**Anil Kumar**	Photophysics of Nucleic acid-Mediated Semiconducting Nanostructures	National Conf. on Advanced Functional	IL-7	20-21 Nov., 2019	Jamia Milia Islamia, New Delhi

			Materials (NCAFM-2019)			
14	**Anil Kumar**	Photophysics of Nucleic acid-Mediated Semiconducting Nanostructures	National Workshop on Photouminesc-ence and functional Materials (NWPFM-2019)	-	20-21 June, 2019	Univ. of Madras, India
15	Priyanka and **Anil Kumar**	Environmental Applications of Nucleotide Molecule(s) Coated Greener Hydrogels	Internat. Conf. on Advanced Mater., Energy and Environmental Sustainability	Abst. 173	Dec. 14-15, 2018	Univ. of Petroleum and Energy Studies, Dehradun, India
16.	Priyanka and **Anil Kumar**	Synthesis and Analysis of Physiochemical Properties of Biomolecule-Mediated Soft Hydrogels	12th Int. Conf. on Complex Fluids and Soft Matter Sponsored by RSC & ACS	Abstract 48 (Poster No. 7)	Dec. 6-9, 2018	LHC, IIT Roorkee, India
17.	A. Kumar, H. Joshi, and **Anil Kumar**	An approach of utilizing the industry waste in the development of maghemite functionalized nanostructures for arsenic removal'	Water Security and Climate Change Conference, (International Network on Sustainable Water Management in Developing Countries (SWINDON))	151	3rd to 5th Dec., 2018	Nairobi, Kenya
18.	A. Kumar, H. Joshi, and **Anil Kumar**	Exploring the scope of nanoparticles for arsenic removal in groundwater	7th Int. Congress on Arsenic in the Environment (As2018)	ISBN 978113 84860-96 *(In Press)*	1st to 6th July, 2018 (CRC	Beijing, China

			Organized by Int. Soc. of Groundwater for Sustainable Development		Press Publisher)	
19.	**Anil Kumar** *(Keynote Speaker – Inaugural Lecture)*	Biomolecules Mediated Greener Nanostructures/ Nanohybrids: Study of their Multifunctional Features	National Conf. on Chemical Sciences: An Interdisciplinary Approach (CSIA-2018)	1	January 18-21, 2018	Dept. of Chemistry, Modern College of Arts, Science and Commerce, Pune (Sponsored by Dept. of Biotechnology)
20.	Komal Gupta and **Anil Kumar**	Multifunctional Features of RNA Mediated CdSe Nanostructures	ACS on Campus IIT Roorkee	-	07th Feb., 2018	IIT Roorkee, Roorkee
21.	Komal Gupta and **Anil Kumar**	Mechanistic Analysis of Fluorescence Behavior of RNA-Mediated Colloidal CdSe Nanostructures For Hg^{2+} Sensing	Trombay Symposium on Radiation & Photochemistry (TSRP-2018)	90	03rd - 07th Jan., 2018	BARC, Mumbai
22.	A. Kumar, H. Joshi, and **Anil Kumar**	Assessing the maghemite (γ-Fe_2O_3) nanoparticles in As(V) removal using laboratory scale batch and column experiments	7th International Groundwater Conference-Groundwater Vision 2030	130 (ISBN: 978-93-81891-42-1)	11th - 13th Dec. 2017	NIH and CGWB at New Delhi, India from
23.	Komal Gupta and	RNA-mediated Fluorescent Water Soluble Colloidal	International Conf. on Advances in	152	30 Nov. -	Dept. of Metallurgical &

	Anil Kumar	CdSe Nanostructures for Environmental Applications	Materials & Processing: Challenges & Opportunities (AMPCO-2017)		2 Dec., 2017	Materials Engg., IIT Roorkee, India
24.	Komal Gupta, Bhupender Singh and **Anil Kumar**	Photophysical Behavior Of Zn^{2+}/PbSe Nanostructures in the presence of Nile Blue: An Analysis of its sorption Behavior	International Conf. on Advanced Materials for Energy, Environment and Health (ICAM-2016)	102 (PP-52)	March 4-7, 2016	Dept. of Chemistry, IIT Roorkee, Roorkee
25.	**Anil Kumar**	Development of Advanced Nanomaterials using Wet Chemical Approach	9th Natl. Seminar on New Paradigm in Chemical Sciences and Analytical Perspectives	16 (Invited Lecture-08)	Feb. 09-10, 2017	Dept. of Chemistry, Punjabi University, Patiala
26.	**Anil Kumar**	Synthesis and multifunctional behavior of some iron oxide and carbon-based greener nanostructures	Prof. R.C. Paul Natl. Symposium on Current Advances in Chemical Sciences	Invited Lecture	Feb. 24-25, 2017	Dept. of Chemistry, Chandigarh University, Chandigarh
27.	*M. Kaloti* and **Anil Kumar**	Synthesis and multifunctional applications of chitosan mediated maghemite nanohybrids	Int. Conf. on Advances in Nanomaterials and Nanotechnol-ogy (ICANN-2016)	317 (Poster - 308)	Nov. 4-5, 2016	Centre of Nanosci. & Nanotech., Jamia Millia Islamia, New Delhi
28.	*M. Khandel-wal* and **Anil Kumar**	Synthesis of graphene by chemical reduction of graphene oxide – Study of their	International Conf. on Advanced Materials for Energy, Environment	70 (YRP-3)	March 4-7, 2016	Dept. of Chemistry, IIT Roorkee, Roorkee

		energy storage applications	and Health (ICAM-2016)			
29.	M.Kaloti, **Anil Kumar** and N. Navani	Synthesis of glucose-mediated Ag-γ-Fe_2O_3 multif-unctional nanocomposites – a study of their catalytic and antibacterial studies	International Conf. on Advanced Materials for Energy, Environment and Health (ICAM-2016)	127 (PP-52)	March 4-7, 2016	Dept. of Chemistry, IIT Roorkee, Roorkee
30.	M. Khandel-wal and **Anil Kumar**	Amino acid mediated synthesis of N-doped graphene and its supercapacitor applications	Int. Conf. on Materials Science & Technology, Conf. Centre	100 (Biom-ater. Biodev./ poster)	1- 4 March, 2016	Univ. of Delhi, Delhi, India
31.	M. Khandel-wal and **Anil Kumar**	Environmental friendly synthesis of N-doped graphene-silver nanocomposites with enhanced optical and electrochemical behaviour ,	Second Conference on Microscopy in Materials Science	28 (OP-9)	Feb. 25-27, 2016	Thapar University, Patiala
32.	**Anil Kumar**	Nanotechnology contributing to the development of advanced materials	Short Term Course on Advance Materials and Characterizatio n Techniques	Expert Talk	June 01, 2015	Dr B R Ambedkar National Institute of Technology , Jalandhar - 144011, Punjab
33.	M. Khandel-wal and **Anil Kumar**	Malonic acid mediated synthesis of one atom thick graphene sheets	5th Int. Conf. on Recent Trends in Applied Physical	1167	May 2-3, 2015 (J. Basic Appl.	"Krishi Sanskriti" at Jawaharlal Nehru

		and its supercapacitor applications in Mathematical/Statistical and Environmental Dynamics"	Chemical Sciences,		Engg. Res. 2(13) 2015) (Poster)	University, New Delhi,
34.	**Anil Kumar**	Chemical Strategies for Synthesis of Green Nanomaterials – Chemistry and Future Scope of Iron Oxide/ Oxyhydoxide Based Nanostructures	EMN Guangzhou Meeting 2015– Energy Materials and Nanotechno-logy (Delivered an Invited Talk)	3 (A-02)	03rd - 06th Dec., 2015	Guangzhou, China
35.	**Anil Kumar** and *<u>Sudhir K. Gupta</u>*	Rheological Properties of Biocompatible Superparamagnetic 5′-Guanosine Monophosphate Mediated Porous Hydrogel of β-FeOOH – Loading, and Release Capabilities of Its Freeze-Dried Gel	Int. Conf. Biomater. 2014 on Polymeric Biomater. Bioengg. & Biodiagnostics	Presen-ted poster	October 27-30, 2014	Indian Institute of Technology Delhi (India), ENEA Rome (Italy) and National Research Council (Italy)
36.	*<u>Sudhir K. Gupta</u>* and **Anil Kumar**	Viscoelastic Properties of Superparamagnetic 5′-Adenosine Monophosphate Mediated Porous β–FeOOH Hydrogel – its Loading, and Release Capabilities	9th India Japan Bilateral Conference (BICON-2014) on Advanced Material Sci. Engg.	(Won best poster award by S.K. Gupta)	Oct. 12-13, 2014.	Biyani Group of Colleges, Jaipur, Rajasthan (India) and JAIST Japan

37.	**Anil Kumar** *(Plenary Lecture 2)*	"Synthesis of Advanced Materials following Wet Chemical Route(s)"	9th India Japan Bilateral Conference (BICON-2014) on Adv. Mater. Sci. Engg.	25-27	Oct. 12-13, 2014	Biyani Group of Colleges, Jaipur, Rajasthan (India) and JAIST Japan
38.	**Anil Kumar** *(Invited Lecture)*	Current Advancements in Nanoscience Present Status and Future Prospects of Sustainable Green Technology	Green Nanotechno-logy	Publis-hed in Proce-edings	June 05-06, 2014	Chandigarh University, Chandigarh
39.	**Anil Kumar** and S.K. Gupta	Synthesis, Characterization and Magnetic Properties of 5'-Guanosine Monophosphate Mediated Porous Hydrogel containing β-FeOOH Nanostructures	National Conference on Nanotechnolog y and Renewable Energy-2014 (NCNRE-2014)	241	April 28-29, 2014	Department of Applied Sciences and Humanities, Jamia Millia Islamia, New Delhi
40.	**Anil Kumar**	Chemical Approach to Design New Material	Natl. Conf. Science Colloquium (Emerging Trends in Basic & Applied Sciences)	2 (Invited Talk)	6- 7th March, 2014	DAV College Jalandhar
41.	**Anil Kumar**	Chemical Sciences Contributing to the Development of New Materials	Nat. Conf. on Recent Trends in Chemical Sciences	8 (IT-5)	25-26, Feb., 2014	Dept. of Chemistry, Guru Jambhesh-war Univ. of Sci &

						Tech., Hisar
42.	**Anil Kumar**	Emphasis on Interdisciplinary Science & Technological Shift, Contributing to the Development of New Materials	2^{nd} Int. Conf. and Exhibition on Materials Science and Engineering	Honor-able Guest Lecture	07^{th} -9^{th} October 2013 (07^{th} Oct.)	Las Vegas, USA
43.	**Anil Kumar** *(Invited Lecture)*	'Biotemplated Semiconductor/ Metal Nanostructures - their Characteristic Features and Future Prospects'	2^{nd} International Conference and Exhibition on Materials Science and Engineering	Invited Talk	08^{th} Oct. 2013	Las Vegas, USA
44.	**Anil Kumar**	Supramolecular Directed Assemblies of Biotemplated Metal / Semiconductor Nanohybrids	5^{th} Szeged International Workshop on Advances in Nanoscience (SIWAN5)	81-82	24-27 Oct., 2012	Szeged, Hungary,
45.	Kanchan Yadav, N. Bogdan, R. Naccache, B. F. Zhang, E. M. Rodriguez, **Anil Kumar** and J. A. Capobian-co	Synthesis of Upconverting $NaGdF_4$ Nanocrystals Doped with Tm^{3+} and Yb^{3+} and its functionalization with Tumour Imaging and Treatment'	'World Congress on Biotechnolo-gy	Won 02^{nd} Best Poster Presentation Prize	04^{th} to 06^{th} May 2012	Leonia Int. Convention Centre, Hyderabad
46.	**Anil Kumar**	Development of Colloidal Nanomaterials	7^{th} Natl. Symp. & Conf. on Solid State	39 (IL4)	Nov. 24 –	Dept. of Chemistry, Faculty of

	(Invited Lecture)		Chem. And Allied Areas (ISCAS -2011)		26, 2011	Natural Sci. Jamia Millia Islamia, New Delhi
47.	<u>Linu, M.</u> and **Anil Kumar**	Synthesis of γ – Fe_2O_3 Based Nanostructures – Study of their Optical and Magnetic Properties	Third Intl. Conf. on Frontiers in Nanoscience and Technology	-	August 2011	Cochin Nano - 2011
48.	**Anil Kumar** *(Invited Lecture)*	Optical and Electronic Properties of Colloidal Semiconductor Nanohybrids	3rd Asia Pacific Symp. On Rad. Chem. (APSRC-2010) and DAR BRNS 10th Biennial Trombay Symp. Rad. & Photochem. (TSRP-2010)	206 – 209 (Invited Talk ITPC-13) (Published in Proc.)	Sept. 14 -17, 2010	Lonavala, India
49.	**Anil Kumar** (Chaired a Session on '*Applications of Catalysts in Industry)*	Photocatalytic Applications of Some Semiconductor Nanosystems.	International Symposium on Ostwald's 100 Years of Catalysis in Chemical Research	*'Catalysis in Green Chemistry / Nanomaterials'*	Nov. 03 – 04, 2009	Allahabad Agricultural Institute, Allahabad
50.	**Anil Kumar** *(Plenary Lecture)*	Biomolecule(s) – Templated Colloidal Metal /Semiconductor Nanohybrids,	Indo-French Workshop cum International Conference on Nanosci. & Nanotechnol.	87 in (Int. Conf. on 16th Oct.)	October 12-16, 2009	Ansal Institue of Technology, Gurgaon
51.	**Anil Kumar**	Morphological Changes in Nucleotide-	Intl. Conf. on Nanomaterials and Devices	77	Dec. 11-13, 2008	IIT Roorkee, India

	and V. Kumar	Capped CdS Nanostructures	Processing and Applications (NADPA 2008)			
52.	**Anil Kumar** and *V. Chaudha-ry*	Electronic Properties of Biotemplated Q-CdS-Ag Nanocomposites,	Intl. Conf. on Nanomaterials and Devices Processing and Applications (NADPA 2008)	77	Dec. 11-13, 2008	IIT Roorkee, India
53.	**Anil Kumar** and *Aditi Singhal*	Synthesis of Fe_2O_3/Ag Core Shell Nanocomposites,	Intl. Conf. on Nanomaterials and Devices Processing and Applications (NADPA 2008)	76	Dec. 11-13, 2008	IIT Roorkee, India
54.	**Anil Kumar** *(Invited Lecture)*	Nanoscience and Nanotechnology – Potential & Challenges	National Convention of Chemistry Teachers (NCCT -2008)	Chaired a Techn-ical Session	Nov. 8 & 9, 2008	HNB Garhwal University, Srinagar
55.	**Anil Kumar**, A. Jakhmola and *V. Chaudha-ry*	Synthesis and photophysics of ZnS/PbS/ZnS quantum dot quantum well – An analysis of dynamics of charge carriers	International Conf. on Nanoscience and Technology (ICONSAT-2008)	A105	Feb. 27- 29, 2008	Indira Gandhi Centre for Atomic Research, DAE, Kalpakkam, India
56.	**Anil Kumar** *(Invited Lecture)*	Photochemistry of Some Nanocolloids	National Symposium on Radiation and Photochemi-stry (NSRP-2007)	IT-2	Jan. 29 – 31 (2007)	Univ. of Madras, Chennai
57.	**Anil Kumar**	Photochemistry of Surface Modified Semiconductor Nanocomposites	National Symposium on Radiation and Photochemistry (NSRP-2007)	IT-2	January 29 – 31 (2007)	Univ. of Madras, Chennai

58.	**Anil Kumar** and N. Mathur	Photocatalytic Decomposition of Anilines at the Interface of Surface Modified TiO_2 – Influence of Loading of Carbonate Ions	Intl- Meeting of Photochem-istry, Photocatalysis and their Environment-al Applications (Photocat 2006)	Oral Presentation	March 29-31, 2006	Agadir, Morocco
59.	**Anil Kumar** *(Invited Lecture)*	Applications of Pulse Radiolysis to Photochemistry – An understanding of Semiconductor Based Photochemical Systems	Workshop on Pulse Radiolysis and its Applications	Invited Presen-tation	June 25, 2005.	Poona Univ., Pune
60.	**Anil Kumar** and N. Mathur	Photooxidation of Aniline at the Interface of TiO_2 Suspensions	UGC sponsored symposium under DRS	25	Oct. 18, 2003	IIT Roorkee, Roorkee,
61.	**Anil Kumar** and S. Mital	Photochemistry of 6-Dimethylaminopurine-capped Cadmium Sulfide Nanoparticles	UGC sponsored symposium under DRS	24	Oct. 18, 2003	IIT Roorkee, Roorkee,
62.	**Anil Kumar**	Photochemistry of Surface Modified Semiconductor Nanocomposites	National Symposium on Radiation and Photochemistry (NSRP-2003)	IT-8	March 3-5, 2003	IIT, Kanpur
63.	**Anil Kumar**	Photophysical and Photochemical Aspects of Nanoparticles of Semiconductors – Investigations on Q-CdS	7^{th} Intl. Conf. on Solar Energy and Applied Photochemis-try (Solar'03) combined with 4^{th} Intl. Workshop on Environ.	Oral Presentation made under Special Session on Nano-	23-28^{th} Feb., 2003	Luxor Egypt

			Photochemistry (Enpho '03)	sci- & Nanot-echnol-ogy		
64.	**Anil Kumar** and Arvind Kumar Jain	Photophysics and Photocatalytic Properties of Sandwich Q-CdS-TiO_2 Semiconductors	Workshop on Radiation and Photochemistry	27	January 4-5, 2002	Pune University
65.	**Anil Kumar** and S. Mital	Electronic Properties of Q-CdS Stabilized by Adenine.	ISRAPS Natl. Symp. on Rad. and Photo-chemistry	16	Feb. 21-23, 2001	Univ. of Roorkee, Roorkee
66.	**Anil Kumar** and A.K. Jain	Effect of doping of Ag^{+} on the photophysics of mixed colloidal CdS – TiO_2 system – correlation of photophysics with its photocatalytic activity	ISRAPS Natl. Symp. on Rad. and Photo-chemistry	15	Feb. 21-23, 2001	Univ. of Roorkee, Roorkee
67.	*D.P.S. Negi* and **Anil Kumar**	Photophysical and Photocatalytic Behaviour of $Cd(OH)_2$ – Coated Q-CdS in the Presence of Certain Heterocycles.	ISRAPS Natl. Symp. on Rad. and Photo-chemistry	TH - 7	Feb. 21-23, 2001	Univ. of Roorkee, Roorkee
68.	R.N. Goyal, **Anil Kumar** and P. Gupta	Mechanisms of electrochemical and persulfate oxidation of tryptophol.	ISRAPS Natl. Symp. on Rad. and Photo-chemistry	K-4	Feb. 21-23, 2001	Univ. of Roorkee, Roorkee

69.	**Anil Kumar**, Vaishali and P. Ramamurthy	Kinetics of oxidation of 3-amino-1-propanol and certain diamines by silver (III).	ISRAPS Natl. Symp. on Rad. and Photo-chemistry	K-3	Feb. 21-23, 2001	Univ. of Roorkee, Roorkee
70.	**Anil Kumar,** *P. Kumar* and Vaishali	Kinetics and Mechanism of Oxidation of Ethylenediamine-tetracetic acid by Diperiodato-argentate (III) ion	ISRAPS Natl. Symp. on Rad. and Photo-chemistry	K-2	Feb. 21-23, 2001	Univ. of Roorkee, Roorkee
71.	**Anil Kumar**	Electronic Properties of Surface Modified Q-CdS Particles – A Comparison of their Photocatalytic Activity with Naked CdS Clusters	Symposium on Recent Trends in Photochemic-al Sciences,	34 (L-30)	January 8 – 10, 2001	RRL, Trivandrum
72.	**Anil Kumar**	Photophysical and photochemical aspects of certain quantized coupled semiconductors.	Trombay Symposium on Radiation and Photochemis-try	38 (Proce-edings, Part II, 499-505 (2000).	Jan. 12-17, 2000	BARC, Mumbai
73.	**Anil Kumar,** D.P.S. Negi and Arvind Kumar Jain	Photophysics and Photochemistry of $Cd(OH)_2$ -coated Quantized CdS and colloidal CdS-TiO_2 Semiconductors - Study of Certain Redox Reactions at their Interface	2nd Asian Photochemis-try Conference	87	June 27 – 30, 1999	Taejon, South Korea
74.	**Anil Kumar,** *Vaishali*	Kinetics and Mechanism of Oxidation of	Seminar on Ultrafast Processes in	43	March 11-13, 1999	Chennai

	and P. Ramamur-thy	Ethylenediamine and Related Compounds by Diperiodato-argentate (III) ion	Biology, Chemistry and Physics			
75.	**Anil Kumar** and <u>*D.P.S. Negi*</u>	Photophysical Behaviour of Cd $(OH)_2$ -coated CdS Particles in the Presence of dl-Tryptophan-study of CdS-initiated Photocatalytic Reaction	National Symposium on Radiation and Photochemistry	PC-7	Feb. 15-17, 1999	Sambalpur
76.	**Anil Kumar**	Photocatalysis Initiated by Semiconductors - Mechanistic Analysis of Colloidal CdS Induced Photochemical Reactions of Certain Organics	Workshop on Recent trends in Photochemical Sciences	48	Jan. 7-9 (1998)	RRL, Trivandrum
77.	**Anil Kumar**	Investigation of Primary Photophysical and Photochemical Events in Irradiated Quantized Semiconductor Particles	Workshop on National Centre for Ultrafast Processes	01	Nov. 28, 1997	Univ. of Madras, Madras
78.	**Anil Kumar** and <u>*D.P.S. Negi*</u>	Study of photophysical and photochemical behaviour of cadmium hydroxide coated cadmium sulphide particles	Recent Trends in Instrumental Methods of Analysis	78	Sept. 18-20, 1997	Univ. of Roorkee, Roorkee

79.	**Anil Kumar,** *Vaishali* and P. Ramamurthy	Kinetics of Oxidation of Ethylene glycol by Diperiodato-argentate (III) - a Comparison of Thermal and Photochemical Reactions	Recent Trends in Instrumental Methods of Analysis, Roorkee	69	Sept. 18-20, 1997	Univ. of Roorkee, Roorkee
80.	**Anil Kumar** and *P. Kumar*	Kinetics of Oxidation of Nitrilotriacetic acid by Diperiodato-argentate (III)	Recent Trends in Instrumental Methods of Analysis, Roorkee	68	Sept. 18-20, 1997	Univ. of Roorkee, Roorkee
81.	**Anil Kumar** and S. Kumar	Photocatalysis Initiated by Quantized CdS Particles - a Mechanistic Investigation	Asian Photochemistry Conf.	136	June 23-26, 1996	Hong Kong
82.	**Anil Kumar**	Study of Early Events in Photochemical Reactions Initiated by Quantized Semiconductor Particles	DST Workshop on National Centre for Ultrafast Processes	13	Jan. 19-20, 1995	Poona Univ., Pune
83.	**Anil Kumar** and S. Kumar	Enchancement of Luminescence of CdS in the Presence of Indoles - Study of CdS Sensitized Reactions of Indoles	XVth IUPAC Symposium of Photochemistry	325	July 17-22, 1994	Prague, Czech Republic

84.	**Anil Kumar**	Photophysical and Photochemical Processes Initiated by Nanometer-sized Particles of Semiconductors	Trombay Symposium on Radiation and Photochemistry	116	Jan. 17-21, 1994	BARC, Bombay
85.	**Anil Kumar**	Fast Kinetics Research in the Study of Nanoparticles	Discussion Meeting on Fast Chemical Reactions	Invited Talk	July 30-31, 1993	Inter University Consortium for DAE Facilities, Indore
86.	**Anil Kumar**	Electron-transfer Reactions in Semiconductor Microelectrodes	Conference on Photochemistry and Laser Chemistry	Oral Presentation	Dec. 19-21, 1990	RRL, Trivandrum
87.	**Anil Kumar**	Electron and Hole Injection of Colloidal CdS by means of Pulse Radiolysis	Mini-symposium held at	Oral Presentation (14th May 1987)	May 13-15, 1987	Max-Planck-Institut, Mulheium/ Ruhr, West Germany
88.	**Anil Kumar**	Catalytic Action of Colloidal Microelectrodes in Photoinduced Chemical Reactions	National Seminar on Advances in Photochemistry and Applications	Oral Presentation	Feb., 1985.	Madras,
89.	**Anil Kumar** and P. Neta	Oxidation of Anilines by Ag (II) Ions	Indian Science Congress Association	Oral Presentation	Jan., 1983	Tirupati,
90.	S.P. Srivastava and **Anil Kumar**	Kinetics and Mechanism of Ag^{+} - catalyzed Oxidation of Diols with Terminal Hydroxyl groups by	Indian Science Congress Association	Oral Presentation	Jan. (1978)	Ahemdabad

		Peroxydisulphate Ion				
91.	S.P. Srivastava and **Anil Kumar**	Kinetics and Mechanism of Ag^{+} - Catalyzed Oxidation of Glycerol by Peroxydisulphate Ion - An Analysis of Consecutive Reactions	Convention of Chemists	Oral Presen-tation	Dec. 1976	Bangalore
92.	S.P. Srivastava and **Anil Kumar**	Kinetics and Mechanism of Ag^{+} - Catalyzed Oxidation of Glycerol by Peroxydisulphate Ion - A Reinvestigation.	Convention of Chemists	Oral Presen-tation	Dec. 1975	Univ. of Roorkee, Roorkee

(K). Complete List of Publications (98) in SCI Journals: (In descending order of publication)

Total Papers in Peer Reviewed Journals 99

List of Publications in Journals			**98** (In descending order of publication year)		
S. No.	**Author(s)**	**Title**	**Journal**	**Vol., Page Nos.**	**Year**
1	S. Thareja and **Anil Kumar***	*In-situ* Wet Synthesis of N-ZnO/N-rGO Nanohybrids as Electrode Material for High Performance Supercapacitor and Simultaneous Non-Enzymatic Electrochem-ical Sensing of Ascorbic acid, Dopamine and Uric acid at their Interface	**J. Phys. Chem. C** doi.org/10.1021/acs.jpcc.1c08413	**125,** 24837-24848	**2021**
2	Atul Kumar, **Anil Kumar***, G.D Varma	Ultrafast resistive type γ-Fe_2O_3-rGO nanohybrids based humidity sensor – a respiratory monitoring tool	***J. Mater. Chem. C***	***9,*** 8002-8010	**2021**

3	S. Thareja and **Anil Kumar***	Water-in-salt' electrolyte based high voltage (2.7 V) sustainable symmetric supercapacitor with superb electrochemical performance - an analysis of the role of electrolytic ions in extending the cell voltage	**ACS Sustainable Chem. Eng.**	***9,*** 2338-2347	**2021**
4	Ajay Kumar, H. Joshi and **Anil Kumar**	Remediation of Arsenic by Metal/ Metal Oxide Based Nanocomposites/ Nanohybrids: Contamination Scenario in Groundwater, Practical Challenges, and Future Perspectives.	**Separation and Purification Rev.** DOI: 10.1080/**154221 19. 2020.1744649**	***50,*** 283-314	**2021**
5	Priyanka and **Anil Kumar***	Smart soft supramolecular hybrid hydrogels modulated by Zn^{2+} / Ag NPs with unique multifunctional properties and applications	**Dalton Trans.**	***49,*** 15095-15108	**2020**
6	Priyanka and **Anil Kumar***	Multistimulus-Responsive Supramolecular Hydrogels Derived by *in situ* Coating of Ag Nanoparticles on 5'-CMP-Capped β-FeOOH Binary Nanohybrids with Multifunctional Features and Applications	**ACS Omega**	***5,*** 13672-13684	**2020**
7	Sahil Thareja and **Anil Kumar***	High Electrochemical Performance of 2.5 V Aqueous Symmetric Supercapacitor based on Nitrogen doped Reduced Graphene Oxide.	**Energy Technol.** ***DOI: 10.1002/ente.20 1901339***	***8,*** **1901339 (1 to 11)**	**2020**
8	**Anil Kumar** and Priyanka	Environmentally benign pH-responsive cytidine-5'-monophosphate molecule-mediated akaganeite (5'-CMP-β-FeOOH) soft supramolecular hydrogels induced by the puckering of ribose sugar with efficient loading/release capabilities.	**New J. Chem.**	***43,*** 14997-15013	**2019**
9.	Komal Gupta and	Zn^{2+}/Cd^{2+}-RNA-mediated Intense White-light-emitting Colloidal CdSe Nanostructures	**J. Mater. Chem. C**	***7,*** 692-708	**2019**

	Anil Kumar*	in Aqueous Medium – Enhanced Photophysics and Porous Morphology Induced by Conformational Change in RNA.			
10	**Anil Kumar** and Komal Gupta	Supramolecular Assisted RNA-Templated Fluorescing Colloidal CdSe QDs Organized in Porous Morphology in the Presence of 1,3-Diaminopropane – Study of their Multifunctional Behavior	**J. Phys. Chem. C**	***122,*** 7898−7915	**2018**
11	M. Kaloti and **Anil Kumar**	Sustainable Catalytic Activity of Ag-Coated Chitosan-Capped Fe_2O_3 Superparamagnetic Binary Nanohybrids (Ag--Fe_2O_3@CS) for the Reduction of Environmentally Hazardous Dyes - A Kinetic Study of the Operating Mechanism Analyzing Methyl Orange Reduction	**ACS Omega**	***3*** (2), 1529–1545	**2018**
12	M. Khandel-wal and **Anil Kumar**	Electrochemical behavior of glycine mediated N-doped reduced graphene oxide	**New J. Chem.**	***41,*** 8333-8340	**2017**
13	**Anil Kumar** and Komal Gupta	RNA-mediated fluorescent colloidal CdSe nanostructures in aqueous medium - analysis of Cd^{2+} induced folding of RNA associated with morphological transformation (0D to 1D)), change in photophysics and selective Hg^{2+} sensing.	**J. Mater. Chem. (A)**	***5,*** 6146-6163	**2017**
14	S. Firdoz and **Anil Kumar**	ZnO nanoparticles and their acarbose-capped nanohybrids as inhibitors for human salivary amylase.	***IET Nanobio-technol.*** **doi:0.1049/iet-nbt.2016.0115**	**11 (3),** 329-335	**2017**
15	M. Kaloti and **Anil Kumar**	Synthesis of chitosan-mediated silver coated γ-Fe_2O_3 (Ag-γ-Fe_2O_3@Cs) superparamagnetic binary nanohybrids for multifunctional applications.	**J. Phys. Chem. C**	***120,*** 17627-17644	**2016**

16	M. Khandel-wal and **Anil Kumar**	One-pot environmental friendly amino acid mediated synthesis of N-doped graphene-silver nanocomposites with enhanced multifunctional behavior	**Dalton Trans.**	***45,*** 5180-5195	**2016**
17	M. Khand-elwal and **Anil Kumar**	Supercapacitor applications of 2-aminoisobutyric acid mediated N-doped graphene.	**Adv. Mater. Proc.**	***1,*** 08-**13**	**2016**
18	M. Khandel-wal and **Anil Kumar**	One-step chemically controlled wet synthesis of graphene nanoribbons from graphene oxide for high performance supercapacitor applications.	**J. Mater. Chem. (A)**	***3,*** 22975-22988	**2015**
19	M. Kaloti, **Anil Kumar** and N.K. Navani	Synthesis of glucose-mediated Ag - γ-Fe_2O_3 multifunctional nanocomposites in aqueous medium - a kinetic analysis of their catalytic activity for 4-nitrophenol reduction.	**Green Chem.**	***17,*** 4786-4799	**2015**
20	U. Kumar Gaur, **Anil Kumar** and G. D. Varma	Fe-induced morphological transformation of 1-D CuO nanochains to porous nanofibers with enhanced optical, magnetic and ferroelectric properties.	**J. Mater. Chem. C**	***3,*** 4297-4307	**2015**
21	**Anil Kumar,** B. Singh and K. Gupta	Photophysical aspects of varying Zn^{2+}/ PbSe nanostructures mediated by RNA leading to the formation of honeycomb-like novel porous morphology	**J. Phys. Chem. C**	***119,*** 6314-6323	**2015**
22	**Anil Kumar** and S. K. Gupta	Supramolecular–directed novel superparamagnetic 5'-adenosine monophosphate templated β-FeOOH hydrogel with enhanced multi-functional properties.	**Green Chem.**	***17,*** 2524–2537	**2015**
23	**Anil Kumar** and M. Khandel-wal	A novel synthesis of ultra-thin graphene sheets for energy storage applications using malonic acid as a reducing agent.	**J. Mater. Chem. A,**	***2,*** 20345–20357	**2014**

24	**Anil Kumar** and S.K. Gupta	5'-Guanosine monophosphate mediated biocompatible porous hydrogel of β-FeOOH - viscoelastic behavior, loading and release capabilities of freeze dried gel.	**J. Phys. Chem. (B)**	***118,*** 10543-10551	**2014**
25	**Anil Kumar** and V. Kumar	Biotemplated inorganic nanostructures: Supramolecular directed nanosystems of semiconductor(s)/metal(s) mediated by nucleic acids and their properties.	**Chem. Rev. (ACS)**	***114,*** 7044-7078	**2014**
26	**Anil Kumar** and M. Khandelwal	Amino acid mediated functionalization and reduction of graphene oxide – synthesis and the formation mechanism of nitrogen-doped graphene**.**	**New J. Chem.**	***38,*** 3457-3467	**2014**
27	U. K. Gaur, **Anil Kumar** and G. D. Varma	The synthesis of self-assembled 1-D CuO nanochains in aqueous medium and a study of their multifunctional features.	**CrystEngC-omm**	***16***, 3005–3014	**2014**
28	**Anil Kumar** and S.K. Gupta	Synthesis of 5'-GMP-mediated porous hydrogel containing β -FeOOH nanostructures: optimization of its morphology, optical and magnetic properties.	**J. Mater. Chem. (B)**	***1***, 5818-5830	**2013**
29	**Anil Kumar** and B. Singh	Optoelectronic properties of dual emitting RNA mediated colloidal PbSe nanostructures.	**Dalton Trans.**	***42***, 11455–11464	
31	**Anil Kumar** and S.K. Gupta	Synthesis of adenine mediated superparamagnetic colloidal β-FeOOH Nanostructure(s) – study of their morphological changes and magnetic behavior.	**J. Nanopart. Res.**	15:1466, 1-16 *(DOI 10.1007/s11051-013-1466-z)*	**2013**
30	**Anil Kumar** and B. Singh	Zn^{2+} induced folding of RNA to produce honeycomb like RNA -mediated fluorescing Zn^{2+}/PbSe nanostructures.	**J. Phys. Chem. (C)**	***117***, 5386–5396	**2013**

32	**Anil Kumar,** V. Chaudhary and Vinit Kumar	Synthesis of guanosine 5′-monophosphate (GMP) - mediated Ag/CdS nanohybrids – their self-assembly and optoelectronic properties.	**Eur. J. Inorg. Chem.**	269-279	**2013**
33	**Anil Kumar** and B. Singh	RNA templated water soluble Mg^{2+}/ PbSe porous nanostructures with dual fluorescence.	**RSC Advances**	***2***, 9079–9090	**2012**
34	**Anil Kumar** and A. Singhal	Optical and magnetic behavior of Ag encapsulated β -Fe_2O_3 core-shell hollow Nanotubes.	**Mater. Chem. Phys.**	***131***, 230-240	**2011**
35	**Anil Kumar** and B. Singh	Synthesis and photophysics of red emitting RNA templated PbSe nanostructures.	**Chem. Commun.**	***47*** (14), 4144 - 4146	**2011**
36	A. Agarwal, H. Joshi and **Anil Kumar**	Synthesis, characterization and application of nano lepidocrocite and magnetite in the degradation of carbon tetrachloride.	**S. Afr. J. Chem.**	***64***, 218-224	**2011**
37	**Anil Kumar** and A. Singhal	Optical, photophysical and magnetic behavior of GMP-templated binary (β -Fe_2O_3/CdS) and ternary (β-Fe_2O_3/Ag/CdS) nanohybrids.	**J. Mater. Chem.**	***21***, 481-496	**2011**
38	S. Firdoz, Ma Fang, XiuliYue, Zhifei Dai, **Anil Kumar**, Jiangbin	A novel amperometric biosensor based on single walled carbon nanotubes with acetylcholine esterase for the detection of carbaryl pesticide in water.	**Talanta**	***83***, 269 - 273	**2010**
39	**Anil Kumar** and V. Kumar	Synthesis and optical properties of Guanosine 5′-monophosphate - mediated CdS nanostructures: An analysis of their structure, morphology and electronic properties.	**Inorg. Chem.**	***48***, 11032-11038	**2009**
40	**Anil Kumar,** A. Jakhmola and V. Chaudhary	Synthesis and photophysics of colloidal ZnS/PbS/ZnS nanocomposites - an analysis of dynamics of charge carriers.	**J. Photochem. Photobiol. A: Chem.**	***208***, 195-202	**2009**

41	**Anil Kumar** and V. Kumar	Supramolecular – directed synthesis of RNA-mediated CdS/ZnS nanotubes.	**Chem. Commun.**	5433-5435	**2009**
42	**Anil Kumar** and A. Singhal	Synthesis of colloidal silver iron oxide nanoparticles – study of their optical and magnetic behavior.	**Nanotech-nology**	***20***, 295606-295616	**2009**
43	**Anil Kumar** and A. Jakhmola	RNA-templated fluorescent Zn/PbS (PbS + Zn^{2+}) supernanostructures.	**J. Phys. Chem. C**	***113***, 9553-9559	**2009**
44	**Anil Kumar** and V. Chaudhary	Time resolved emission studies of Ag-adenine-templatedCdS (Ag/CdS) nanohybrids.	**Nanotech-nology**	***20***, 095703 - 095712	**2009**
45	**Anil Kumar** and V. Kumar	Self-assemblies from RNA-templated colloidal CdS nanostructures.	**J. Phys. Chem. C,**	***112***, 3633-3640	**2008**
46	**Anil Kumar** and A. Singhal	Synthesis of colloidal β-Fe_2O_3 nanostructures - influence of addition of Co^{2+} on their morphology and magnetic behavior.	**Nanotechno-logy**	***18***, 475703	**2007**
47	**Anil Kumar** and V. Chaudhary	Optical and photophysical properties of Ag/CdS nanocomposites – an analysis of relaxation of charge carriers.	**J. Photochem. Photobiol. A: Chem.**	***189***, 272-279	**2007**
48	**Anil Kumar** and A. Jakhmola	RNA – mediated fluorescent Q-PbS nanoparticles.	**Langmuir (Lett.)**	***23***, 2915-2918	**2007**
49	**Anil Kumar** and N. Mathur	Photocatalytic degradation of aniline at the interface of TiO_2 suspensions containing carbonate ions.	**J. Colloid Interface Sci.**	***300***, 244-252	**2006**
50	**Anil Kumar** and A. Jakhmola	Photophysics and charge dynamics of Q-PbS based mixed ZnS/PbS and PbS/ZnS semiconductor nanoparticles.	**J. Colloid Interface Sci.**	***297***, 607-617	**2006**
51	**Anil Kumar**	Physicochemical and photochemical properties of nanoscale semiconductors -	**Natl. Acad. Sci. Lett.** *(Published as Lead Article)*	***28***, 1-11	**2005**

		dynamics of the charge carriers.			
52	**Anil Kumar** and N. Mathur	Photocatalytic oxidation of aniline using Ag^{+}-loaded TiO_2 suspensions.	**Appl. Catal. A: Gen.**	***275***,189 -197	**2004**
53	**Anil Kumar** and S. Mital	Electronic and photocatalytic properties of purine(s)-capped Q-CdS nanoparticles in the presence of tryptophol.	**J. Mol. Catal. A: Chem.**	***219***, 65-71	**2004**
54	**Anil Kumar** and S. Mital	Synthesis and photophysics of 6-dimethylaminopurine-capped Q-CdS nanoparticles – a study of its photocatalytic behavior.	**Int. J. Photoenerg.**	***6***(2), 61-68	**2004**
55	**Anil Kumar** and S. Mital	Photophysics and photocatalytic behavior of composite CdS-purine nanoparticles in the presence of certain indoles.	**J. Colloid Interface Sci.**	***265***, 432-438	**2003**
56	**Anil Kumar** and A.K. Jain	Photophysics and photocatalytic properties of Ag^{+} - doped composite (CdS-TiO_2) colloidal semiconductor.	**J. Photochem. Photobiol. A: Chem.**	***156***, 207-218	**2003**
57	R.N. Goyal, **Anil Kumar** and P. Gupta	Electrochemical and persulphate mediated oxidation of indole -3- ethanol	**Indian J. Chem.**	***41A***, 719-726	**2003**
58	**Anil Kumar** and S. Mital	Synthesis and photophysics of purine-capped Q-CdS nanocrystallites.	**Photochem. Photobiol. Sci.**	***1***, 737-741	**2002**
59	**Anil Kumar** and S. Mital	Electronic properties of Q-CdS clusters stabilized by adenine	**J. Colloid Interface Sci.**	***240***, 459-466	**2001**
60	**Anil Kumar,** Vaishali and P. Ramamur-thy	Kinetics of oxidation of 3-amino-1-propanol and related compounds by silver (III) species.	**J. Chem. Soc. Perkin Trans.**	***2*** (7), 1174 – 1179	**2001**
61	R.N. Goyal, **Anil Kumar** and P. Gupta	Oxidation chemistry of indole -3- methanol	**J. Chem. Soc. Perkin Trans.**	***2*** (4), 618-623	**2001**

62	**Anil Kumar** and D.P.S. Negi	Photophysics and photocatalytic properties of $Cd(OH)_2$ -coated Q-CdS clusters in the presence of guanine and related compounds	**J. Colloid Interface Sci.**	***238***, 310-317	**2001**
63	**Anil Kumar** and A. K. Jain	Photophysics and photochemistry of colloidal CdS-TiO_2 coupled semiconductors - Photocatalytic oxidation of indole	**J. Mol. Catal. A: Chem.**	***165***, 265-273	**2001**
64	**Anil Kumar** and D.P.S. Negi	Photocatalytic and photophysical behaviours of $Cd(OH)_2$ - coated Q-CdS in the presence of tryptophan	**J. Photochem. Photobiol. A: Chem.**	***134***, 199-207	**2000**
65	**Anil Kumar,** Vaishali and P. Ramamurthy	Kinetics and mechanism of oxidation of ethylenediamine by diperiodatoargentate (III) ion.	**Int. J. Chem. Kinet.**	***32***, 286-293	**2000**
66	**Anil Kumar** and A. Kumari	Photocatalytic oxidative C-C bond cleavage of 1,2-ethanediol initiated by aqueous titanium dioxide dispersion - influence of Ag^{+} on the catalytic activity	**Res. Chem. Intermed.**	***25***, 695-708	**1999**
67	**Anil Kumar,** P. Kumar and P. Ramamur-thy	Kinetics of oxidation of glycine and related substrates by diperiodatoargentate (III)	**Polyhedron**	***18***, 773-780	**1999**
68	**Anil Kumar** and P. Kumar	Kinetics and mechanism of oxidation of nitrilotriacetic acid by diperiodatoargentate (III)	**J. Phys. Org. Chem.**	***12***, 79-85	**1999**
69	**Anil Kumar** and A. Panwar	Separation and quantification of aniline and its oxidation products	**Chem. Anal. (warsaw)**	***43***, 93-97	**1998**
70	**Anil Kumar** and S. Kumar	Colloidal CdS induced photocatalytic reaction of 2-methylindole - mechanistic analysis of oxidation of indoles	**J. Phys. Org. Chem.**	***11***, 277-282	**1998**
71	**Anil Kumar,** S.	Photocatalytic oxidative C-C bond cleavage of the pyrrole	**J. Chem. Res. (S)**	***1***, 54-55	**1998**

	Kumar and D.P.S. Negi	ring in 3-methylindole induced by colloidal CdS particles			
72	**Anil Kumar** and A. Panwar	Kinetics of oxidation of 2,4-, 2.6-, 3,4- and N, N-dimethylanilines by $[Ag(OH)_4]^-$	**Oxidn. Commun.**	***20***, 258-266	**1997**
73	**Anil Kumar** and S. Kumar	Catalytic effect of Ag^+ in colloidal CdS- induced photooxidation of aniline	**Chem. Lett.**	711-712	**1996**
74	**Anil Kumar** and S. Kumar	Enhancement of luminescence of colloidal CdS in presence of indoles - study of CdS sensitized reaction of indole	**J. Photochem. Photobiol. A: Chem.**	***83***, 251-256	**1994**
75	**Anil Kumar** and A. Panwar	Kinetics of oxidation of aniline and xylidine by tetrahydroxoargentate ion.	**Bull. Chem. Soc. (Japan)**	***67***, 1207-1212	**1994**
76	**Anil Kumar** and A. Panwar	Gas chromatographic separation of isomeric aminophenols, aniline, phenol, benzoquinone and azobenzene on HP-1 capillary column	**Mikrochim. Acta**	***111***, 177-182	**1993**
77	**Anil Kumar** and S. Kumar	Photoluminescence of colloidal cadmium sulfide in the presence of aniline - study of the CdS – sensistized photocataytic reaction	**J. Photochem. Photobiol. A: Chem.**	***69***, 91-95	**1992**
78	**Anil Kumar**	Photoinduced processes in colloidal semiconductors – physicochemical properties and applications.	**ISRAPS Bulletin** (Published by ISRAPS)	***3*** (1), 2-5	**1992**
79	S.P. Srivastava, **Anil Kumar,** S. Sinha and A. Panwar	Selective oxidation of xylidines by peroxydisulphate ion - oxidation of 2,3-, 2,6- and 3,5 - xylidines	**Oxidn. Commun.**	***14*** (3), 196-202	**1991**
80	**Anil Kumar,** A. Henglein and H. Weller	Photochemistry and radiation chemistry of semiconductor colloids - preparation of colloidal PbO_2 and various electron transfer processes	**J. Phys. Chem.**	***93***, 2262-2266	**1989**
81	**Anil Kumar,** E. Janata and	Photochemistry of colloidal semiconductors - quenching of	**J. Phys. Chem.**	***92***, 2587-2591	**1988**

	A. Henglein	CdS fluorescence by excess positive holes			
82	A. Henglein, **Anil Kumar**, E. Janata and H. Weller	Photochemistry and radiation chemistry of semiconductor colloids - reaction of the hydrated electron with CdS and non-linear optical effects.	**Chem. Phys. Lett.**	***132***, 133-136	**1986**
83	**Anil Kumar**	Kinetics of oxidation of ethanolamine and diols by Ag (II).	**J. Phys. Chem.**	***86***, 1674-1678	**1982**
84	**Anil Kumar** and P. Neta	Reduction and demetalation of silver porphyrins in aqueous solution.	**J. Phys. Chem.**	***85***, 2830-2832	**1981**
85	**Anil Kumar**	Oxidative C-C bond cleavage of 1, 2-diols by Ag (II)	**J. Am. Chem. Soc.**	***103***, 5179-5182	**1981**
86	**Anil Kumar** and P. Neta	Complexation and oxidation of glycine and related compounds by Ag (II).	**J. Am. Chem. Soc.**	***102***, 7284-7289	**1980**
87	**Anil Kumar** and P. Neta	Oxidation of Ag^+ and Ag $(NH_3)_2{}^+$ complex as studied by pulse radiolysis.	**J. Phys. Chem.**	***83***, 3091-3095	**1979**
88	S.P. Srivastava, **Anil Kumar** and V.K. Gupta	Kinetics and mechanism of Ag^+ - catalysed oxidation of hexane- 1,6-diol by peroxydisulphate ion.	**Rev. Roumaine de Chim.**	***26***, 939 - 946	**1981**
89	S.P. Srivastava, **Anil Kumar**, A.K. Mittal and V.K. Gupta	Kinetics and mechanism of Ag(I)-catalysed oxidation of pentane -1,5-diol by peroxydisulphate ion	**Oxidn. Commun.**	***1***, 265-273	**1981**
90	S.P. Srivastava, G. Bhattacha-rjee, **Anil Kumar** and S. Pal	Kinetics and mechanism of periodate oxidation of salicylic acid.	**Indian J. Chem.**	***19A***, 578-579	**1980**

91	S.P. Srivastava, **Anil Kumar,** A.K. Mittal and V.K. Gupta	A kinetic study of peroxydisulphate oxidation of sulphadrugs - oxidation of sulphanilamide.	**Indian J. Chem.**	***17A***, 593 - 595	**1979**
92	J.C. Gupta, M.K. Mahe-shwari, S.P. Srivastava and **Anil Kumar**	Kinetics and mechanism of Ag^{+} - catalysed oxidation of amyl alcohol, iso-amyl alcohol and crotylcohol by peroxydisulphate ion.	**Indian J. Chem.**	***18A***, 31-33	**1979**
93	S.P. Srivastava and **Anil Kumar**	Kinetics and mechanism of Ag^{+} - catalysed oxidation of 1,4-butanediol by peroxydisulphate ion.	**Kinet. Catal.**	***19***, 1415-1418	**1978**
94	S.P. Srivastava, V.K. Mahesh, R. Sharma and **Anil Kumar**	Thin layer chromatography or some closely related physiologically active 2-benzoyl benzofuran deriavatives.	**Chem. Anal. (Warsaw)**	*23*, 837	**1978**
95	S.P. Srivastava and **Anil Kumar**	Ag^{+} - catalyzed presulphate oxidation products of 1,3-propanediol, 1-4-butanediol and 1,5-pentanediol.	**Indian J. Chem.**	***15B***, 967-968	**1977**
96	S.P. Srivastava and **Anil Kumar**	Kinetics of Ag^{+} - catalysed oxidation of 1,3- propanediol by peroxydisulphate ion - a reinvestigation.	**Indian J. Chem.**	***15A***, 1114 - 1115	**1977**
97	S.P. Srivastava and **Anil Kumar**	Kinetics and mechanism of Ag^{+} - catalysed oxidation of glycerol by peroxydisulphate ion - An analysis of consecutive reactions.	**Indian J. Chem.**	***15A***, 1061 - 1065	**1977**

98	S.P. Srivastava, R.N. Goyal, Rajeev Jain and **Anil Kumar**	Rapid TLC separation of some closely related coupled products of β-ketosester with aryldiazonium chlorides.	**Z. Anal. Chem.**	***286***, 248	**1977**
99	S.P. Srivastava, V.K. Dua and **Anil Kumar**	TLC separation of closely related diols.	**Z. Anal. Chem.**	***286***, 247	**1977**
100	S.P. Srivastava, H. Singh and **Anil Kumar**	Kinetics of silver catalysed oxidation of formamide by potassium peroxydisulphate.	**J. Indian Chem. Soc.**	***32***, 404 - 407	**1975**

(L). Major Innovative Achievements in Research – *In chronological Order*

(a). Analysis of the catalytic role of Ag^+ in initiating certain redox reactions

In a series of papers on this issue, the species of silver were generated chemically, radiolytically and electrochemically and then investigated their reactions kinetically on early as well as longer time scales.[1-11] Initial work on this area was carried out at ***Rad. Lab., Univ. of Notre Dame***, ***USA*** in collaboration mainly with renowned Radiation Chemist, ***Prof. P. Neta***. These investigations led to establish some ***long debated issues*** on **catalytic role of Ag^+ in a number of redox reactions** in aqueous medium.

S.No.	***Reference***	***Citations****
1.	***Anil Kumar*** *and P. Neta,* ***J. Phys. Chem. 83, 3091-3095 (1979).***	***21***
2.	***Anil Kumar*** *and P. Neta,* ***J. Am. Chem. Soc. 102, 7284-7289 (1980).***	***43***
3.	***Anil Kumar****,* ***J. Am. Chem. Soc. 103, 5179-5182 (1981).***	***20***
4.	***Anil Kumar*** *and P. Neta,* ***J. Phys. Chem. 85, 2830-2832 (1981).***	***28***
5.	***Anil Kumar****,* ***J. Phys. Chem. 86, 1674-1678 (1982).***	***16***
6.	***Anil Kumar*** *and A. Panwar,* ***Bull. Chem. Soc. (Japan) 67, 1207-1212 (1994).***	***08***
7.	***Anil Kumar*** *and A. Panwar,* ***Oxidn. Commun. 20, 258-266 (1997).***	***04***
8.	***Anil Kumar*** *and P. Kumar,* ***J. Phys. Org. Chem. 12, 79-85 (1999).***	***46***
9.	***Anil Kumar****, P. Kumar and P. Ramamurthy,* ***Polyhedron 18, 773-780 (1999).***	***125***
10.	***Anil Kumar,*** *Vaishali and P. Ramamurthy,* ***Int. J. Chem. Kinet., 32, 286-293 (2000).***	***18***
11.	***Anil Kumar,*** *Vaishali and P. Ramamurthy,* ***J Chem. Soc. Perkin*** **Trans.** ***2*** **(7) 1174–1179 (2001).**	**02**

It also led us to realize the importance of **zero valent Ag (*now known as Ag nanoparticles*) in catalysis** and led us to submit a proposal to DST, New Delhi in 1984 incorporating this and other literature ideas.

(b**). Initiation of Research in the Area of Nanoscience and Nanotechnology**

We had been among the **early workers, who have initiated work on nanomaterials in India**. In our first research proposal entitled. ***"Catalytic Action of Colloidal Microelectrodes in Photoinduced Chemical Reactions,***" submitted to DST, New Delhi in 1984. The photocatalytic work using colloidal solution of metals and semiconductors as photocatalyst(s) was proposed. After it was sanctioned, however, it could not be taken up as we got an offer from West Germany to collaborate with a **pioneering** worker, ***Prof. A. Henglein, Hahn-Meitner, Institut, Berlin as Guest Scientist to*** carry out a research project in the related area.

(c). **Synthesis and Analysis of Optical Properties of Semiconductor NPs/QDs – Effect of chemically stored charge carriers on the charge dynamics**

In our early investigations with ***Prof. A. Henglein*** *at HMI, Berlin* on colloidal nanoparticles, the effect of chemically stored charge carriers on the **optical** and **photophysical** properties of some colloidal semiconductor NPs (**CdS** and **PbO_2**) was examined.[12-14] Such a situation is often encountered in studies on nanomaterials involving ***intense light sources like lasers and high energy radiation beam***. In the experiments with CdS NPs the excess electrons and holes were injected into the particles radiolytically / photolytically. It exhibited ***non-linear optical*** effect. The accompanied optical and emission changes were also monitored using **combined photo- and radiation chemical** techniques,[12,13] revealing an interesting charge carrier dynamics in irradiated semiconductors.

S.No.	Reference	*Citations**
12	*A. Henglein, **Anil Kumar**, E. Janata and H. Weller,* **Chem. Phys. Lett. 132,133-136 (1986).**	***179***
13	***Anil Kumar**, E. Janata and A. Henglein,* **J. Phys. Chem. 92, 2587-2591 (1988).**	***50***
14	***Anil Kumar**, A. Henglein and H. Weller,* **J. Phys. Chem. 93, 2262-2266 (1989).**	***22***

(d). **Synthesis, Analysis and Enhancement of Physicochemical Features of Nanomaterials for Multifunctional Applications**

(i). Photocatalytic Action of Semiconductor Microelectrodes

In a subsequent work through a **DST project** awarded in 1989, colloidal particles of CdS semiconductor were employed as photocatalyst(s) in context of developing ***efficient solar energy conversion systems***.[15-19] The photogenerated electron-hole pairs were exploited to perform ***redox reactions*** *at the* ***interface of semiconductor nanocrystallites*** by using a variety of redox couples such as aromatic amines and indoles in aerated aqueous medium under ***visible light irradiation*** and carried out extensive mechanistic analysis involving the interfacial interactions and intermediates, which are very well cited.

S.No.	Reference	*Citations**

15	***Anil Kumar** and S. Kumar, **J. Photochem. Photobiol. A: Chem., 69, 91-95 (1992).***	***26***
16	***Anil Kumar** and S. Kumar, **J. Photochem. Photobiol. A: Chem., 83, 251-256 (1994).***	***21***
16	***Anil Kumar** and S. Kumar, **Chem. Lett., 711-712 (1996).***	***05***
18	***Anil Kumar**, S. Kumar and D.P.S. Negi, **J. Chem. Res. 1, 54-55 (1998).***	***03***
19	***Anil Kumar** and S. Kumar, **J. Phys. Org. Chem. 11, 277-282 (1998).***	***09***

(ii). Improvement in Photocatalytic Action and Charge Separation in Illuminated Surface Modified and Binary Semiconductor Components

In other DST project awarded in 1994, surface of these particles were modified chemically by coating with $Cd(OH)_2$ and coupling of two semiconducting components like **CdS-Ag_2S**, **CdS-TiO_2** were synthesized and identified by analyzing their characteristic absorption and emission, particle size, emission lifetime and redox reactivity.[20-27] Coating of **$Cd(OH)_2$ on Q-CdS** produced composite particles with enhanced photostability (Φ_{-CdS} <0.002), luminescing efficiency and emission lifetime.[20-21] These particles were highly selective in initiating the photoinduced reactions of solutes like certain **indoles** and **nucleic bases**. Relaxation kinetics demonstrated that there is a distribution of charge carriers to various depths on the surface of $Cd(OH)_2$ - coated Q-CdS. Shallowly trapped hole affects the oxidation by intercepting the bulk solute *via* H-bonding interaction involving -OH of $Cd(OH)_2$ layer of CdS and certain functional group(s) of the additives. Deeply trapped hole remains inaccessible for the additives present either on the surface or in the bulk.

Doping of Ag^+ to Q-CdS generated **microheterojunctions** consisting of CdS - Ag_2S phases and doping of metal ions to oxygenated TiO_2 suspensions also increased the reactivity of holes.[23] The coupling of **$Cd(OH)_2$ - coated Q-CdS** with **colloidal TiO_2** in aqueous medium removes and the illumination of these composites under visible light improved the charge separation leading to the enhanced reactivity of e^--h^+ pair. The activation of both $Cd(OH)_2$ - coated Q-CdS and TiO_2 with certain transition metal ions and then coupling them with their respective non-activated component produces an efficient photocatalyst in certain cases.[24] The catalytic action of Ag^+ is understood in terms of the positive redox potential of Ag^+/ Ag couple, which serves to intercept the conduction band electron by reducing the e^- - h^+ recombination.

Nucleic bases were observed to stabilize Q-CdS clusters effectively. Their capping improved the **photocatalytic activity at the interface significantly.**[25-27] A few of these nanosystems could be recycled several times without any significant loss in reactivity.

Some research work addressing the **environmental issues** using TiO_2 suspensions in aqueous medium was also undertaken. Mechanisms of these reactions were analyzed,[28,29] which are largely accepted by readers.

S.No.	***Reference***	***Citations****
20	***Anil Kumar** and D.P.S. Negi, **J. Photochem. Photobiol. A:Chem**.134.199-207(2000).*	***15***
21	***Anil Kumar** and D.P.S. Negi, **J. Colloid Interface Sci.** 238, 310-317 (2001).*	***11***
22	***Anil Kumar** and A.K. Jain, **J. Mol. Catal. A: Chem.** 165, 267-275 (2001).*	***101***

23	***Anil Kumar** and A.K. Jain, **J. Photochem. Photobiol. A:Chem.** 156, 207-218 (2003).*	***26***
24	***Anil Kumar** and S. Mital, **J. Colloid Interface Sci.** 240, 459-466 (2001).*	***16***
25	***Anil Kumar** and S. Mital, **Photochem. Photobiol. Sci. (commun.)** 1, 737-41 (2002).*	***15***
26	***Anil Kumar** and S. Mital, **J. Colloid Interface Sci.** 265, 432-438 (2003).*	***08***
27	***Anil Kumar** and S. Mital, **Int. J. Photoenerg.** 6(2), 61-68 (2004).*	***12***
28	***Anil Kumar** and N. Mathur, **J. Colloid Interface Sci.** 300, 244-252 (2006).*	***110***
29	***Anil Kumar** and S. Mathur, **Appl. Catal. A: Gen.** 275,189-197 (2004).*	***65***

(iii). Enhancement of Electronic Properties and Photophysics of Quantized II-IV and IV-VI Semiconductors

An interesting **achievement** was made by carrying out **bio-molecule(s) mediated synthesis of II-VI and IV-VI semiconductor nanostructures in quantum-confined region.**[30-43] In a DST project funded under nanomission, interfacing of Q-ZnS with PbS and Q-PbS with ZnS has been utilized to produce tailored PbS nanocomposites with tunable electronic properties.[30] The separation of charge is enhanced in case of PbS/ZnS core-shell particles. The deposition of Q-ZnS layer as shell at the interface of Q-ZnS/PbS produces ZnS/PbS/ZnS nanocomposites.[31,32] The addition of Zn^{2+} further improves the charge separation in this system.

In our original work published in **Langmuir (letter)**, **RNA-capped Q-PbS**[33] were produced in face centered cubic phase, which displayed excitonic features with relatively a strong narrow emission band (FWHM 70 nm) at **675 nm** under broad excitation range extending from 330 to 620 nm. In the presence of Zn^{2+} these particles produced fluorescent **Zn/PbS (PbS+ Zn^{2+}) supernanostructures**.[31] We also demonstrated the nucleation and growth of templating **Q-CdS NPs,[32] CdS/ZnS nanotubes[35] to create novel nano- and micro assemblies.** In other interesting work we have fabricated **GMP-mediated nanowires**[34] with increased separation of charge. During last two years we had synthesized fluorescing CdSe nanostructures,[42,43] and exhibited rectifying behavior. These nanohybrids were exploited for sensing of toxic metal ions like Hg^{2+} up to 100 pm.[43]

Lately we have succeeded in the synthesis of **dual fluorescing PbSe nanostructures** having a wide absorption range covering UV-visible-NIR region (200–1200 nm) of varied morphologies.[36-42] The excess metal ions such as **Mg^{2+}**,[41] and **Zn^{2+}**[38] present on the RNA strand **induces polarization** in the PbSe through Se to result in varied supramolecular interactions by replacing Pb^{2+} among different building blocks to produce ***porous and honeycomb like morphologies*** in the process of self-assembly. The **poor NIR absorption** and **fairly intense fluorescence** in the wavelength range of ***850–1100 nm*** of the as synthesized PbSe nanohybrids and relatively higher red (~300 ns), and NIR lifetime (31.8 ns) as compared to those of organic fluorescent dyes (<1.5 ns) shows the potential of these materials to serve **as an effective tool for the fluorescence imaging of body fluids and tissues in the NIR region, where tissues do not absorb.**

From this work we have **established** that the **specific RNA sequence is not required for mediating the synthesis of fluorescing II-VI (CdS, ZnS, CdSe)** and **IV-VI semiconducting nanostructures.** Apart from that their **growth** and **change in morphologies,** their **optoelectronic behavior** could be **controlled quite effectively.** Lately, their **sensing** applications are being performed.[41-43] We have recently developed ***widely explored intense white emission*** from ***CdSe based nanostructures***.[44]

We have also contributed a review article on **biotemplated inorganic nanostructures** published in **Chemical Reviews** comprising semiconductor(s)/metal(s) nanosystems mediated by nucleic acids and their optical, photophysical and magnetic properties.[45] This review is well cited.

Some work was also contributed on bare Fe and Mn doped CuO semiconducting nanostructures[46,47] of varied morphologies and observed their **enhanced optical, magnetic, ferroelectric and dielectric behavior.**

S.No.	***Reference***	***Citations****
30	***Anil Kumar** and A. Jakhmola, **J. Colloid Interface Sci. 297, 607-617 (2006)**.*	***21***
31	***Anil Kumar** and A. Jakhmola, **J. Phys. Chem. (C), 112, 3633-3640 (2009).***	***13***
32	***Anil Kumar**, A. Jakhmola and V. Chaudhary, **J. Photochem. Photobiol A: Chem 208, 195- 202 (2009).***	***12***
33	***Anil Kumar** and A. Jakhmola, **Langmuir (Lett.), 23, 2915-2918 (2007).***	***82***
34	***Anil Kumar** and V. Kumar, **J. Phys. Chem. (C), 112, 3633-3640 (2008).***	***27***
35	***Anil Kumar** and V. Kumar, **Inorg. Chem., 48, 11032-11037 (2009).***	***13***
36	***Anil Kumar** and V. Kumar, **Chem. Commun., 5433-5435 (2009).***	***05***
37	***Anil Kumar** and B. Singh, **Chem. Commun., 47 (14), 4144 - 4146 (2011).***	***15***
38	***Anil Kumar** and B. Singh, **Dalton Trans., 42, 11455–11464 (2013).***	***07***
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42	***Anil Kumar** and K. Gupta, **J. Mater. Chem. (A), 5, 6146-6163 (2017).***	***09***
43	***Anil Kumar** and K. Gupta, **J. Phys. Chem. (C), 122, 7898−7915 (2018).***	***01***
44	***Anil Kumar** and K. Gupta, **J. Mater. Chem. (C), DOI: 10.1039/c8tc05560b (2019).***	***-***
45	***Anil Kumar** and V. Kumar, **Chem. Rev. 114, 7044-7078 (2014).***	***63***
46	Umesh Kumar Gaur, **Anil Kumar** and G D Varma ***CrystEngComm (RSC), 16, 3005–3014 (2014).***	***21***
47	Umesh Kumar Gaur, **Anil Kumar** and G D Varma, ***J. Mater. Chem. C, 3, 4297- 4307 (2015).***	***20***

(iv). Mechanistic Analysis of Charge Separation Dynamics and Photophysics of Metal-Semiconductor binary Nanohybrids

In **Ag/CdS** nanocomposites the content of Ag was noted to modify the nature of surface interaction between the two components by influencing the emission behavior and charge carrier dynamics in a complex scheme.[48,49] At low molar ratio of Ag:CdS an enhancement in fluorescence is observed which has been attributed to the excited state charge transfer interaction between the two components. Relaxation kinetics of charge carriers of CdS also revealed the formation of **transitory CT complex** between excited CdS and Ag, in which the extent of electron transfer is controlled by the amount of Ag. With biotemplated Ag/CdS nanocomposites[50] an enhancement in the intensity of emission of bare CdS by about 7 folds associated with an increase in the separation of charge. This **mechanism,** proposed for the first time, is well cited.

S.No.	***Reference***	***Citations****
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49	***Anil Kumar** and V. Chaudhary, **Nanotechnology, 20, 095703 - 095712 (2009).***	***16***
50	***Anil Kumar,** V. Chaudhary and V. Kumar, **Eur. J. Inorg. Chem., 269-279 (2013).***	***01***

(e). **Iron Oxide Based Nanosystems for Multifunctional Applications**

(v). Development of Iron Oxide based Nanostructures and Nanohybrids

Iron oxide based magnetic nanostructures due to their wide ranging multi-disciplinary applications are being considered to be important being environmentally benign, biocompatible and cost effective. In a CSIR sponsored project we have developed several **iron oxide based nanosystems** in **beta phase** in different morphologies exhibiting superparamagnetic behavior.[51-54] For the first time silver iron oxide (**$AgFeO_2$**) NPs[51] in β- phase depicted a narrow size distribution and the water soluble core-shell nanostructures consisting of colloidal Ag in the core and iron oxide hollow nanotubes in the shell.[52] The **binary** and **ternary nanohybrids** of iron oxide with other semiconducting (CdS) and metal (Ag) NPs[53] have also been synthesized and analyzed the dynamics of charge carriers in the irradiated systems.

S.No.	***Reference***	***Citations****
51	***Anil Kumar** and A. Singhal, **Nanotechnology, 18, 475703 (2007).***	***36***
52	***Anil Kumar** and A. Singhal, **Nanotechnology, 20, 295606-295616 (2009).***	***19***
53	***Anil Kumar** and A. Singhal, **Mater. Chem. Phys. 131, 230-240 (2011).***	***12***
54	***Anil Kumar** and A. Singhal, **J. Mater. Chem., 21, 481-496 (2011).***	***15***

(vi). Biotemplated colloidal β–FeOOH Nanohybrids & Hydrogels – their Formation, Loading and Release Capabilities

In other project biotemplated colloidal β–FeOOH nanostructures by the hydrolysis of $FeCl_3$ using adenine,[55] 5'–AMP[56] and 5'–GMP[57] biomolecules as template(s). In these nanostructures, β–FeOOH displays enhanced optical and magnetic features as compared to that of bare β–FeOOH, which are fairly different to those of α–Fe_2O_3, β–Fe_2O_3, γ–Fe_2O_3, Fe_3O_4 and γ–FeOOH. Bare β–FeOOH exhibits the formation of nanorods, whereas in the presence of biotemplates it showed the biomolecule dependent change(s) in the morphology by converting nanorods to quantum dots. The extent of interaction of biomolecule with Fe^{3+} controlled this conversion and follows the order: ***5′–AMP > 5′–GMP > adenine***. These templates have also been found to form **hydrogels with β–FeOOH**. In view of the template like ***5'-GMP / 5'-AMP*** and β-FeOOH being biocompatible and the **hydrogels** being **superparamagnetic**, we have explored their **viscoelastic properties, loading and release capabilities** in the context of their possible biomedical applications.[58] In our recent work we have achieved remarkable success in developing hitherto unreported ***5′–CMP molecule based smart hydrogels.***[59-61] The high porosity, surface area, % swelling, and loading and release performance of the hydrogel indicate its potential for drug delivery and other biological / biomedical applications.

S.No.	***Reference***	***Citations****

55	***Anil Kumar*** *and S. K. Gupta,* ***J. Nanopart. Res., 15:1466, 1-16 (2013) (DOI 10.1007/s11051-013-1466-z).***	***15***
56	***Anil Kumar*** *and S. K. Gupta****, Green Chem., 17, 2524–2537 (2015).***	***19***
57	***Anil Kumar*** *and S. K. Gupta****, J. Mater. Chem. (B), 1, 5818-5830 (2013).***	***15***
58	***Anil Kumar*** *and S. K. Gupta,* ***J. Phys. Chem. (B), 118, 10543-10551 (2014).***	***11***
59	***Anil Kumar*** *and Priyanka,* ***New J. Chem. 43, 14497-15013 (2019).***	***07***
60	*Priyanka and* ***Anil Kumar, ACS Omega, 5, 13672–13684 (2020).***	***04***
61	*Priyanka and* ***Anil Kumar, Dalton Trans. 49, 15095-15108 (2020).***	**-**

(vii). Greener Protocols for gamma Iron Oxide (γ-Fe_2O_3) based Nanosystems - their SERS, Biological and Catalytic Applications

Some nanocomposites/nanohybrids of iron oxide like glucose mediated and chitosan mediated silver coated **γ-Fe_2O_3** like **Ag–γ-Fe_2O_3**[60] and **Ag–γ-Fe_2O_3@Cs**[61,62] have been explored for their **catalytic, SERS** and **antibacterial activities** using the model dye(s) and bacteria, respectively. The superparamagnetic behavior of as synthesized binary nanocomposites at room temperature with high value of **saturation magnetization** makes them highly suitable for usage as catalyst, allowing their convenient recyclability. All the components of the as synthesized nanocomposite(s) being biocompatible, environmentally benign, demonstrating effective catalytic, SERS and antibacterial activities qualify them as a **greener nanosystems(s)** with **multifunctional applications.** The catalytic reduction of certain dyes investigated kinetically at their interface followed Langmuir-Hinshelwood's mechanism. Further work on these nanosystems is in progress.

S.No.	***Reference***	***Citations****
60	M. Kaloti, **Anil Kumar** and N. Navani, ***Green Chem., 17, 4786-4799 (2015).***	***26***
61	M. Kaloti, and **Anil Kumar,** ***J. Phys. Chem. C 120, 17627-17644 (2016).***	***34***
62	M. Kaloti, and **Anil Kumar,** ***ACS Omega, 3 (2), 1529–1545 (2018).***	***18***

(viii). Greener Protocols for Synthesis of Reduced Graphene Oxide (rGO) – Supercapacitor and SERS Applications

Lately, we have synthesized **ultra-thin**[63] **and a few layer(s) thick N-functionalized graphene sheets**[64-67] employing **mild/environmental friendly reducing agents** for the effective reduction of GO under **mild experimental conditions** in **aqueous medium**. The higher nucleophilicity of the malonic acid is observed to be more effective for the **efficient reduction of GO** to produce thin graphene sheets. The judicious control of pH of the reaction mixture brings a change in the morphology of graphene into **nanoribbons**[68] involving supramolecular interactions among the residual functionalities of reduced GO and malonic acid besides controlling the ***nucleophilicity*** of the later. The changed morphology of graphene exhibit improved characteristic features for the **high performance supercapacitor applications.**[68] The functionalization of N-doped graphene (GRH-Gly) with Ag NPs further enhanced the multifunctional features as regards to its conductivity, surface area and **SERS**.[68] ***In our recent work*** we have succeeded in ***extending the potential window of symmetric supercapacitor to remarkably high value of 2.5 V*** with significantly ***higher energy density*** at ***power density***.[69] These systems are found to be with relatively **better conducting** with fairly high value of **specific capacitance** at higher **current densities**, exhibiting potential for **supercapacitor applications**.[62-68] Water-in-Salt like electrolyte enhance the cell voltage to 2.7 V.[70] Further work on making devices using ***environmentally benign***

materials, ***electrolytic components*** and ***protocols*** is in progress. A patent on enhanced features of these materials has been filed two years back. Lately, based on rGO, we have developed an efficient humidity sensor[71] and a non-enzymatic electrochemical sensor for certain biomolecules.[72]

S.No.	***Reference***	***Citations****
63	**Anil Kumar** and M. Khandelwal, **J. Mater. Chem. (A), A, 2014, 2, 20345–20357 (2014).**	***28***
64	**Anil Kumar** and M. Khandelwal, ***New J. Chem., 38, 3457-3467 (2014).***	***52***
65	M. Khandelwal and **Anil Kumar**, ***Advanced Materials Proceedings 1, 08-13 (2016).***	***-***
66	M. Khandelwal and **Anil Kumar**, ***New J. Chem., 41, 8333-8340 (2017).***	***14***
67	M. Khandelwal and **Anil Kumar**, ***J. Mater. Chem. (A), 3, 22975-22988 (2015).***	***64***
68	M. Khandelwal and **Anil Kumar**, ***Dalton Trans., 45, 5180-5195 (2016).***	***31***
69	S. Thareja and **Anil Kumar**, ***Energy Technol., 1901339 (2020).***	***10***
70	S. Thareja and **Anil Kumar**, ***ACS Sustainable Chem. Engg., 9, 2338-2347 (2021).***	***12***
71	A. Kumar, **Anil Kumar** and G.D Varma, ***J. Mater. Chem. C*, 9, 8002–8010 (2021).**	***05***
72	S. Thareja and **Anil Kumar**, ***J. Phys. Chem. C, 125, 24837-24848 (2021).***	***06***

***Note -** The citations shown above are as per Google Scholar Data including Self-citations.

In summary, we have made several innovative contributions to the research in the area of ***Physical Chemistry*** covering wide ranging topics on ***chemical kinetics***, ***photochemistry/ radiation chemistry,*** *and* ***nanochemistry***.

(M). Details of M.Tech. /M. Phil. Supervised (21):

S. No.	**Name of the Student** **Name of the Supervisor(s)** **Year**	**Title of Dissertation**
1.	**Avdesh Kumar** Prof. Anil Kumar 2014	Synthesis of Glucose Mediated Ag/ZnO Nanocomposites and a Study of Their Optical Properties
2.	**Harsh Kumar** Prof. Anil Kumar 2013	Synthesis of PVP Stabilized Silver Nanostructures and Study of Their Physical and Biological Properties
3.	**Neetu Yadav** Prof. Anil Kumar 2013	Synthesis of Cystein-Coated-Ferrite Nanoparticles-Study of Adsorption of Certain Hazardous Metal Ions on Their Surface
4.	**Kanchan Yadav** Prof. Anil Kumar 2012	Syntheis of Upconverting $NaGdF_4$: Tm^{3+}/Yb^{3+} Nanoparticles- Study of Their Biocompatible Surface Modification
5.	**Queeny Dasgupta** Prof. Anil Kumar 2012	Synthesis of Biotemplated Fluorescent Silver Nanostructures and Their Physicochemical Properties
6.	**Anuj Kumar** Prof. Anil Kumar 2011	Synthesis and Characterization of Ag-supported Hydroxylapatite γ-Fe_2O_3 Nanocomposites (AgHAP- γ-Fe_2O_3)

7.	**Linu M** Prof. Anil Kumar 2011	Synthesis of Surface-Modified Superparamagnetic Iron Oxide Nanocomposites
8.	**Shaik Firdoz** Prof. Anil Kumar 2010	Synthesis of Metal Oxide Nanoparticles and Their Inhibitory Action for Glycoside Hydrolases
9.	**Ashutosh Agarwal** Prof. Anil Kumar Prof. Himanshu Joshi 2009	Synthesis, Characterization and Application of Nanoparticles in Water Remediation
10.	**Santi Prasad Chakrabarti** Prof. Anil Kumar Prof. R. Nath 2004	Study of Physical and Electrical Properties of Ferric Oxide Nanoparticles
11.	**Neeru Gupta** Prof. Anil Kumar 2003	Physicochemical Properties of Metal Sols
12.	**Lallan Singh Yadav** Prof. Anil Kumar 2001	Development of TiO_2 Supported Rigid Material- Study of Their Photocatalytic Activity
13.	**Anshuman Jakhmola** Prof. Anil Kumar 2000	Photocatalytic Redox Reactions of Certain Organics Intiated by TiO_2 Suspensions
14.	**Tapan Bhatnagar** Prof. Anil Kumar 1999	Analysis of Photocatalytic Behaviour of TiO_2 Suspension in Aqueous Medium for Certain Redox Couple(s)
15.	**Jagat Singh** Prof. Anil Kumar 1998	Photooxidation of Certain Organics Using TiO_2 suspension as catalyst
16.	**Kuldeep Singh Bhandari** Prof. Anil Kumar 1995	Study of Ruthenium (II) Tris(Bipyridyl) – Sensitized Photochemical Reaction of Indole – Effect of Certain Semiconductors on the Mechanism of the Reaction
17.	**Lalit Mohan Singh Negi** Prof. Anil Kumar 1995	Study of Cadmium Sulphide- Induced Photochemical Reaction of 2,3- Dimethyl Indole
18.	**Ranjana Uniyal** Prof. Anil Kumar 1993	Photosensitized Reaction of Aniline Using Mixed and co-Colloids Catalysis of Zinc Sulfide and Cadmium Sulfide
19.	**Nidhi Bharti** Prof. Anil Kumar 1992	Photosensitized decomposition of 1-Naphtylamine Using Visible Light Radiation
20.	**Raksha Gupta** Prof. Anil Kumar 1991	Photochemical Treatment of Industrial Coal Wastes- Photodecomposition of Indole
21.	**Anita Agarwal** Prof. Anil Kumar 1990	Separation and Quantization ofHalophenols and Related Compound by Gas Chromatography

(N). Details of M.Sc. Project supervised (40):

S. No.	Name of the Student	Title of Project

	Name of the Supervisor(s) Year	
1.	**Rajesh Prasad Verma** Prof. Anil Kumar 2022	Synthesis of sulphur-doped reduced graphene oxide – its electrochemical characterization and sensing of mercury (II) ions on its surface
2.	**Akash** Prof. Anil Kumar 2022	Synthesis of phosphorous-doped reduced graphene oxide – its electrochemical characterization and sensing of dopamine and uric acid on its surface
3.	**Vikas Yadav** Prof. Anil Kumar 2021	Synthesis of activated carbon material derived from Eucalyptus leaves and their electrochemical applications.
4.	**Priyanka** Prof. Anil Kumar 2021	Synthesis of tryptophan-mediated hydrogels and their applications
5.	**Charchita Gautam** Prof. Anil Kumar 2020	Synthesis of carboxymethyl cellulose and 5'-adenosine monophosphate-mediated supramolecular porous hydrogels doped with Zn^{2+} ion and silver nanoparticles
6.	**Naveen Ojha** Prof. Anil Kumar 2020	Reduction and functionalization of graphene oxide employing thiamine hydrochloride as a reducing agent - synthesis of N and S-doped reduced graphene oxide
7.	**Sumit Kumar Yadav** Prof. Anil Kumar 2019	Synthesis and Characterization of Cysteine-Capped MnS Nanoparticles – an Analsis of their Photophysical Behavior
8.	**Narendra Kumar Yadav** Prof. Anil Kumar 2019	Synthesis and Characterization of γ– Fe_2O_3 Nanoparticles using Aloe-vera as a Capping Agent – Analysis of its Photocatalytic Activity
9.	**Parveen** Prof. Anil Kumar 2018	Synthesis and Characterization of Fe_3O_4-SiO2-ZnO Nanocomposites - Study of Adsorption and Photocatalytic Activity For Methylene Blue Degradation
10.	**Arun Garg** Prof. Anil Kumar 2017	Synthesis and Characterization of β-Cyclodextrin Coated Fe_3O_4 Nanoparticles and Study of their Surface and Photocatalytic Behavior
11.	**Sanjana** Prof. Anil Kumar 2016	Synthesis of PVA-Coated Zerovalent Iron Nanoparticles and Study of their Catalytic Activity fopr the Reduction of 4-Nitrophenol.
12.	**Kriti Seth** Prof. Anil Kumar 2015	Synthesis of MCM-41 – Its Use as a Support for the Preparation of CdS Nanoparticles
13.	**Sneha Paul** Prof. Anil Kumar 2014	Synthesis and Characterization of Polyvinyl Alcohol Coated γ– Fe_2O_3 Nanoparticles
14.	**Moni Kumari Gupta** Prof. Anil Kumar 2012 ***(M.Sc. Integrated)***	Synthesis of Nanohydroxyapetite- A Study of Its Interaction with Elastin
15.	**Venkatesh Tunuguntla** Dr. Anil Kumar 2010	Synthesis and Characterization of Manganese Ferrite Nanoparticles by Non- Hydrolytic Sol- Gel Process

16.	**Pankaj Kumar Choubey** Dr. Anil Kumar 2008	Microwave Assisted Synthesis of Zinc Oxide Nanoparticles.
17.	**Dibyendu Kumar Das** Dr. Anil Kumar 2007	Synthesis and Characterization of TiO_2 Nanoparticles
18.	**Debashree Das** Dr. Anil Kumar 2005	HPLC Analysis of Some Fullerenes in Carbon Soot
19.	**Aarti** Dr. Anil Kumar 2004	Synthesis and Physicochemical Properties of Colloidal Iron Oxide
20.	**Mohammad Ilyas** Dr. Anil Kumar 2003	Kinetics of Oxidation of Tartaric Acid by Diperiodatoargentate (III) Ion
21.	**Amar Deep** Prof. Anil Kumar 2002	Kinetics of Oxidation of Benzyl Alcohol by Diperiodato- Argentate (III) Ion
22.	**Ila Dharmsaktu** Dr. Anil Kumar 2002	Photophysical Properties of Lead Sulphide Particles
23.	**Arvind Kumar Gejwal** Dr. Anil Kumar 2001	Kinetics of Oxidation of N- Propylamine by Diperiodato- Argentate (III) Ion
24.	**Virendra singh** Dr. Anil Kumar 2000	HPLC Separation of Certain Purines, Pyrimidines and Tryptophan
25.	**Vijender Kumar** Prof. Anil Kumar 1999	Kinetics of Oxidation of Acetone by Diperiodato- Argentate (III) Ion
26.	**Sanjeev Sharma** Prof. Anil Kumar 1998	Effect of Doping of Doping of Fe^{2+} and Fe^{3+} on the Photocatalytic Activity of TiO_2 for the Oxidation of 1,2- Ethanediol
27.	**Amit Kaushik** Prof. Anil Kumar 1997	Colloidal CdS- Sensitized Photochemical Reaction of Indole-3-Acetic Acid
28.	**Minakshi Verma** Dr. Anil Kumar 1997	Kinetics of Oxidation of Succinic Acid by Diperiodato Argentate (III)
29.	**Sanjay Gupta** Prof. Anil Kumar 1996	Chromatographic Separation of Indoles and related compounds
30.	**Charu Arora** Prof. Anil Kumar 1995	Kinetics of Oxidation of Alcohols by Bis (Periodato) Argentate (III)
31.	**Sucheta Sangawar** Prof. Anil Kumar 1994	Synthesis of Composite Semiconductor (CdS/PhS) Particles and Study of their Physical Properties
32.	**Alok Gupta** Prof. Anil Kumar 1993	Reaction of Tetrahydroxoargentate (III) Ion with 1-Napthylamine.

33.	**A.S.R. Prasad** Prof. Anil Kumar 1993	Light Induced Reactions of 1-Napthylamine Using Cadmium Sulphide as a Photocatalyst
34.	**Anurag Kumar Bhatnagar** Dr. Anil Kumar 1992	Synthesis and Photochemical Behaviour of Silver (II) Phenanthroline Complexes.
35.	**Vivek Kumar** Prof. Anil Kumar 1991	Study of Photoluminescence Property of Cadmium Sulphide in Presence of Aromatic Amines and their Photocatalytic Reactions
36.	**Meher Bala Lalit** Prof. Anil Kumar 1990	Effect on Photoluminescence of Zinc Sulphide by Different Metal Ions
37.	**Anumolu Anand Kumar** Prof. Anil Kumar 1989	Mechanism of Reaction of Ag (III) Species With Some Organics
38.	**Archana** Prof. Anil Kumar 1989	Separation of Aromatic Amines Phenols and Related Compounds by HPLC
39.	**Prasanna Kumary M.N.** Prof. Anil Kumar 1985	The Redox Reactions and Stabilisation of Unusual Valency States of Metal
40.	**Arunan. K.** Prof. Anil Kumar 1984	Physico- Chemical Studies of Few Transitions Metal Complexes

(O). **Any other Information** (about 500-600 words):

I have been among the early contributors ***on*** *nanoscience/nanotechnology* in ***India***, ***who has initiated research in this area,*** as is also evidenced from our published research work/presentations/proposals submitted to DST, New Delhi. Our first research project on these systems was sanctioned as early as in 1985 by DST *vide letter* D.O. No. 23(1P-20)/84 dated Dec. 10, 1985, but could not be taken up at that time as I received an offer to join as a Guest Scientist at Hahn-Meitner-Institut, Germany with pioneering Radiation Chemist, Prof. A. Henglein on radiation chemical aspects of nanomaterials and worked there till 1988. Thereafter, we initiated work on synthesis and photochemistry of metal and semiconductor nanosystems at IIT Roorkee mainly through **projects** funded by the **DST**, New Delhi. Our research work on these as well as earlier systems was recognized by ***The National Academy of Sciences, Allahabad, India*** and was **Elected as Fellow** of this prestigious academy in 2003.

Over the years, we have ***addressed a number of issues pertaining to research*** on ***nanomaterials*** and contributed immensely to their synthetic protocols. Apart from these, I have been instrumental at IIT Roorkee in establishing a ***Centre of Excellence–Nanotechnology*** and also introduced a ***new teaching program for M.Tech. (Nanotechnology)***, which is still running successfully.

Lately, increasing environmental issues have necessitated to develop newer materials following ***greener protocols.*** In this context, during last one and a half decade our research has focused on developing ***greener/biocompatible nanohybrids*** and integrated nanostructures with ***enhanced multifunctional features***, addressing some ***environmental issues***. Specifically, biopolymers and their components/ other biocompatible molecules have provided the ***novel capping agent(s)*** for growing different greener nanohybrids of semiconductors (II-VI/IV-VI /iron oxide(s)/oxyhydroxide(s) semiconductors/metal(s)) with ***1D / 2D / 3D / porous nano-architectures***. These researches include ***semiconductor(s)/metal(s) and their nanohybrids with excellent photophysical/ photochemical, catalytic behavior*** as well as designing of ***smart hydrogels.***

In recent years, we have fabricated some newer electrode materials, *viz.* ***ultra-thin / a few layer(s) thick N-functionalized reduced graphene oxide (rGO) sheets***, ***nanoribbons,*** and ***Ag-coated rGO,*** employing **mild/environmental friendly** *reducing agents* for the reduction of GO in ***aqueous medium*** for devising efficient supercapacitors. Lately, we have succeeded in ***extending the potential window of symmetric supercapacitor*** *to* ***fairly high value of 2.5 V*** with significantly ***high energy density@power density***. These systems exhibited ***better conductivity*** with fairly high value of ***specific capacitance*** *at higher* ***current densities***. Water-in-Salt like electrolyte has further enhanced the cell voltage to ***remarkably high*** *at* ***2.7 V***. A patent on enhanced features of these materials has been filed ***three years back*** and ***last year on their sensing capabilities***. This work has been ***identified*** by the prestigious Confederation of Indian Industry (CII) among the innovations from IIT Roorkee during 2021. We also got one patent granted in 2022 on the related work.

Most of our work in the area of nanoscience/nanotechnology is published in ***International Journals*** *of repute* with an ***average impact factor*** of ***> 5.7***, indicating the ***importance of our work in the context of current scientific importance.*** Out of 22 Ph.D. students, I have supervised so far, ***18 students have carried out their research on nanosystems*** including ***2 students*** in the broad area *of* ***present ongoing work.***

In our ongoing research, we aim to develop innovative ***functionalized greener nanostructures*** as electrode material(s) and optimization of their electrochemical performance in ***aqueous electrolyte(s)*** to fabricate ***high-voltage*** supercapacitor to act as ***efficient energy storage device(s).*** Besides, being ***environmentally benign*** and functionalized, these nanohybrids are also expected to be suitable for ***selective electrochemical sensing*** with ***lower limit of detection, hydrogen storage*** and ***electro-catalytic*** applications.
