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### **Research Interest:**

- ❖ Optoelectronic devices based on novel materials and nanostructures.
- ❖ Colloidal quantum dot/perovskite-based light emitting diodes and ASE.
- ❖ Solution processed Quantum dot (QD)/ perovskite/ organic based single junction and tandem solar cells.
- ❖ Building integrated semi-transparent solar cells
- ❖ Light management, charge transport and recombination dynamics in nanostructured and thin film-based devices.
- ❖ Infrared to visible photon up-conversion and up-conversion based devices.

### **Education:**

#### **PhD in Physics**

**Dec. 2015**

Indian Institute of Technology Kharagpur

*Thesis title: Efficiency enhancement in nanostructured zinc oxide conjugated polymer based inverted hybrid solar cells*

*Thesis supervisor: Prof. A. Dhar*

*Degree awarded: August 2016.*

#### **M.Sc. in Physics**

**July 2010**

Indian Institute of Technology Kharagpur

*Master Thesis: Efficient water-splitting with solution processed porous titanium di oxide.*

*Thesis Supervisor: Prof. S. K. Ray*

#### **B.Sc. in Physics (Honours)**

**July 2008**

University of Calcutta

## **Professional Experience:**

- June 2021-present**      *Assistant Professor (IIT Roorkee)*      **Short-wave infrared colloidal quantum dot based opto-electronics**
- January 2016 – May 2021**      *Post-doctoral fellow, Prof. Gerasimos Konstantatos group (ICFO-The Institute of Photonic Sciences, Spain).*      **Colloidal quantum dot based infrared opto-electronic devices**
- September 2015- January 2016**      *Research Engineer, Prof. Gerasimos Konstantatos group (ICFO-The Institute of Photonic Sciences, Spain).*      **Colloidal lead sulfide quantum dot based photovoltaics**
- June – December 2014**      *IUSSTF BASE fellow, Prof. Sean E. Shaheen group (University of Colorado at Boulder, USA, partly with NREL, Colorado).*      **Recombination dynamics of high performance organic and hybrid photovoltaics with transient techniques**
- July 2010-May 2015**      *PhD fellow, Prof. A. Dhar group (Indian Institute of Technology Kharagpur, India)*      **Efficiency enhancement in nanostructured zinc oxide conjugated polymer based inverted hybrid solar cells'**

## **Scholastic Honours:**

### ***Competitive examination qualified***

- UGC-CSIR National Eligibility Test (**NET**) December 2009, Govt. of India
- Graduate Aptitude Test for Engineers (**GATE**) 2010
- Joint Entrance Screening Test (**JEST**) 2009
- Ranked in national top 1% in National Graduate Physics Examination (**NGPE**)-2008 organised by Indian Association of Physics Teachers(IAPT)

- Selected for Bhaskara Advanced Solar Energy (**BASE**) fellowship – 2013-14 sponsored by Indo-US science & Technology Forum (**IUSSTF**) and DST, Govt. of India.

### *Fellowships*

- **MCM Scholarship**-IIT Kharagpur, During M.Sc. course 2008 to 2010
- **National Scholarship**-Govt. of West Bengal, During B.Sc. course 2005-2008
- **Junior Research Fellow**-MHRD, Govt. of India, from July 2010 to June 2012
- **BASE Fellow**- IUSSTF & DST, Govt. of India, from June 2014 to November 2014
- **Senior Research Fellow**- MHRD, Govt. of India, from July 2012 to May 2015
- **ICFO Post-doctorate fellowship**- from January 2016 to present

### **Publications summary:**

Published 27 journal articles, 1 US patent and attended 14 international conferences. *Total citations:* 733, *h-index:* 14, *i-10 index:* 17; *Source:* Google Scholar (<https://scholar.google.com/citations?user=gAlnrIAAAAJ&hl=en>)

### *Important publications*

- [1] **S. Pradhan**, F. Di Stasio, Y. Bi, S. Gupta, S. Christodoulou, A. Stavrinadis and G. Konstantatos, High efficiency colloidal quantum dot infrared light emitting diodes via engineering at the supra-nanocrystalline level, *Nature Nanotechnology*. 2019, *14*, 72-79. (IF- 31.53, citations: 120, Covered by 7 news outlets).
- [2] **S. Pradhan**, M. Dalmasses, G. Konstantatos, Solid-state Thin-Film Broadband Short-wave Infrared Light Emitters, *Advanced Materials* 2020, *32*, 2003830. (IF-27.39, citations: 8, Covered by 8 news outlets).
- [3] Y. Bi\*, **S. Pradhan\***, S. Gupta, M. Z. Akgul, A. Stavrinadis, G. Konstantatos, Infrared Solution-Processed Quantum Dot Solar Cells Reaching External Quantum Efficiency of 80% at 1.35  $\mu\text{m}$  and  $J_{sc}$  in Excess of 34  $\text{mA cm}^{-2}$ , *Advanced Materials*, 2018, *30*, 1704928. (\*equal contribution). (IF-27.39, citations: 82).
- [4] **S. Pradhan**, M. Dalmases, A.-B. Baspinar, G. Konstantatos, Highly Efficient, Bright and Stable Colloidal Quantum Dot Short-Wave Infrared Light Emitting Diodes, *Advanced Functional Materials* 2020, *30*, 2004445. (IF-16.84, citations: 12)
- [5] **S. Pradhan**, A. Stavrinadis, S. Gupta, S. Christodoulou, G. Konstantatos, Breaking the Open-Circuit Voltage Deficit Floor in PbS Quantum Dot Solar Cells through Synergistic Ligand and Architecture Engineering, *ACS Energy Lett.*, 2017, *2*, 1444–1449. (IF-19, citations: 58).
- [6] **S. Pradhan**, A. Stavrinadis, S. Gupta, Y. Bi, F. Di Stasio, G. Konstantatos, Trap-State

Suppression and Improved Charge Transport in PbS Quantum Dot Solar Cells with Synergistic Mixed-Ligand Treatments, *Small*, 2017, 13, 1700598. (IF- 11.46, citations: 56).

[7] A. Stavrinadis, **S. Pradhan**, P. Papagiorgis, G. Itskos, G. Konstantatos, Suppressing Deep Traps in PbS Colloidal Quantum Dots via Facile Iodide Substitutional Doping for Solar Cells with Efficiency >10%, *ACS Energy Lett.*, 2017, 2, 739–744. (IF-19, citations: 79)

### **Teaching Experience:**

- Teaches NTN-601 (Structural analysis of Nanomaterials) (Autumn 2021-22), NTN-605 (Electronic properties and measurement techniques of nanomaterials) (Spring 2021-22) at Centre of Nanotechnology, **IIT Roorkee**.
- Teaching assistant, basic physics for B. Tech 1st year students (3 lectures per week) at the Dept. of Physics and Meteorology, **IIT Kharagpur**. (2 semesters)
- Teaching assistant, Electrodynamics-1 course for 2nd year integrated M.Sc students (1 lecture per week) at the Dept. of Physics & Meteorology, **IIT Kharagpur**. (1 semester)
- Laboratory instructor for 3<sup>rd</sup> year master students of Engineering Physics at **UPC**, Barcelona for the course “Photovoltaic device characterizations”. (3 semesters)
- Laboratory instructor for B. Tech students at the Dept. of Physics and Meteorology, **IIT Kharagpur**. (5 semesters)
- Laboratory instructor for masters’ students (EM & Optics laboratory), Department of Physics & Meteorology, **IIT Kharagpur**. (2 semesters)

### **Laboratory course design & Lab set-up:**

Involved in designing a lab course titled as “Photovoltaic device characterizations” for third year graduate student at Universitat politecnica de Catalunya (UPC), Barcelona.

### **Positions of responsibility:**

- Mentored two M. Tech and three M. Sc students towards the completion of their respective projects at IIT Kharagpur.
- Overseen three summer fellows for the completion of their projects at ICFO. Partially mentored a PhD student at ICFO.
- Currently supervising 2 PhD students at IIT Roorkee.

### **Journal reviewer:**

Reviewed article from the journal *Nature Communications*, *Scientific Reports*, *RSC*, *springer*

*journals etc.*

**Languages:**

English: Fluent

Spanish: Communication

Bengali: Mother tongue

Hindi: Fluent