

Curriculum Vitae (CV)

Dr. Biplab Kumar Patra

Personal Details

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Contact Information

Dr. Biplab Kumar Patra
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Summary

- ❖ Sound educational background and experimental knowledge.
- ❖ Hard working and motivative for research with good communication skills.
- ❖ Expertise in synthesis of nanomaterials and functional materials for green energy, memory, photonic applications using various technics (E-beam Lithography, Sol-gel/Hot injection/Schlenk line synthesis/Chemical Vapour Deposition/PVD/VLS growth), characterizations using TEM/SEM/XRD/XPS/AFM/UV-VIS/PL/TSCPC/FTIR/SQUID.
- ❖ Bottom-up capillary assembly/self-assembly approach to make functional materials, surface chemistry modifications for improved electrical transport.
- ❖ Photovoltaic devices from Halide Perovskite QDs, 2D perovskites. Thin films solar cell, light emitting diodes, transistors.

- ❖ Expertise in photo electrochemistry to generate hydrogen and oxygen from water.

Education and Research

- ❖ Postdoc (Nov, 2016- Oct, 2019) – AMOLF (Atomic and Molecular Physics)- Physics of Functional Complex Matters, Amsterdam, The Netherlands. Nanoscale Solar Cell Group and Centre for Nanophotonics with Prof. Erik Garnett.
- ❖ PhD in Materials Science (Jan, 2012-Oct, 2016), IACS Indian Association for the Cultivation of Science, Kolkata, India with Prof. Narayan Pradhan
- ❖ M.Sc in Chemistry (2009-2011): Vidyasagar University, Paschim Medinipur, West Bengal, India. (Score-82.41%)
- ❖ B.Sc in Chemistry with Hons (2006-2009): Midnapur College, Vidyasagar University, India.

Scholarships, Fellowships and Awards

- ❖ Awarded West Bengal Government Merit-Cum-Means Scholarship at Higher Secondary Level during 2004-2006.
- ❖ Awarded West Bengal Government Merit-Cum-Means Scholarship Graduate level during 2006-2009 and Post-Graduate level during 2009-2011.
- ❖ Qualified NET in chemistry (National Eligibility Test, India) June 2011 with CSIR fellowship. All India Rank 46.
- ❖ Qualified GATE in chemistry (Graduate Aptitude Test in Engineering, India) March 2011.
- ❖ Best Oral Presentation Award in Materials Science Day 2016 at IACS.
- ❖ Got DST travel grant to attend conference in USA (MRS- Sanfrancisco).

Conferences and Presentations

- Physics@veldoven 2017, Veldoven, The Netherlands
- Next Gen-PV Materials Groningen 2017
- Physics@veldoven 2018
- Physics@veldoven 2019

- Attending **GRC** (Poster presentation) in Switzerland (May, 2019) on Self-assembly and Supramolecular chemistry.
 - Attending **EMRS** (Oral presentation) in Nice, France (May, 2019).
 - National Symposium on **Frontiers in Chemical Sciences** 2011 at Vidyasagar University.
 - An Initiative from the American Chemical Society “**ACS on Campus**” in 2012.
 - 6th International Conference on Nano Science and Technology (ICONSAT), 2014 at Chandigarh, India. (**Presented Poster**)
 - 7th Bangalore INDIA NANO 2014. (**Best Poster Award**)
 - **Poster Presentations** at IACS on National Science Day Celebration 2015.
 - **Oral Presentations** on Materials Science Day 2016 at IACS.
- (It is selected as the **best oral presentation** in Materials Science Department).

Professional Competence

I have experiences in handling the following instruments and I am familiar with the techniques that are used to understand structure-function relationship of different functional materials based on semiconductor nanomaterial and the metal-semiconductor heterostructure.

- CVD/PVD, Glove-box and Schlenk line Technique for synthesizing metallic, semiconducting and insulating nanomaterials, thin films, quantum dots (QDs), nanowires, nanocubes nanosheets etc.
- Expertise in synthesis and characterization perovskite nanostructures and thin film for optoelectronic applications.
- Self-assembly/capillary assembly of perovskite nanocubes.
- E-beam lithography technics to make nanophotonics structures.
- Characterizations of nanomaterials using UV-Vis Spectrometer, Integrating sphere, PL fluorimeter, X-ray diffraction, TEM, SEM, AFM, XPS.
- Making optoelectronic devices using HHV and Angstrom Thermal Evaporation Unit, solar simulator and probe station.
- CHI 760 D Electrochemical Work Station (CH Instruments) for photo electrochemical water splitting.

- Gas Chromatograph for detecting hydrogen (PerkinElmer Clarus GC 580 fitted with a thermal conductivity detector TCD, connected to molecular sieve column).

Skills

- **Colloidal synthesis** of semiconductor nanomaterials and formation of heterostructures with plasmonic gold (Au), palladium (Pd) and platinum (Pt) for efficient photocatalysis and photo electrocatalysis.
- **Synthesis of perovskites** nanostructures, shape control and ligand binding chemistry.
- **Making** thin film of perovskites for different optoelectronic applications like solar cells, LEDs, and lasing behavior.
- **Surface chemistry** from insulating long chain to conducting short chain to get better electron transport for solar cells/photodetector/LEDs/transistors.
- Synthesis of **2D perovskites** in a wide variety for strong exciton-photon coupling under resonance inside tunable microcavity for generating **Polaritons**.
- Exploring perovskite QDs as **single photon emitter measuring g^2** measurement.
- **Self-assembly** of CsPbBr₃ nanocubes in arbitrary patterns like lines and square grid patterns for making ultrathin **wave guides**. Single crystalline circular perovskite patterns for making **ring resonating LASERS**. (work in under process).
- **Self-assembly** of CsPbBr₃ nanocubes to make **photonic and phononic crystals** (Work in process in collaboration with Cambridge)
- **Capillary assembly** of Cu and Ag nanocubes in certain geometries and further chemical welding of each nanocubes in patterns to make **transparent electrode** (work in process).