PRASHANT KUMAR, Ph.D.
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RESEARCH INTEREST

Exploration of novel synthetic strategies for chemical composition control and surface modifications in inorganic semiconductors for investigation of structure-property relationship, and use this understanding to develop improved materials and devices for a wide range of applications in energy harvesting and generation, electronics, displays, lighting and memory devices.

POSTDOCTORAL RESEARCH EXPERIENCE

KAUST Solar Center, King Abdullah University of Science and Technology KAUST), Kingdom of Saudi Arabia — March, 2018—March, 2021
- Thin film resistive memory and transistor application
- Electrode materials for solid state rechargeable battery

Metallurgical Engineering and Materials Science Department, Indian Institute of Technology Bombay (IIT Bombay), INDIA — June, 2016—January, 2018
- Development of novel synthetic strategies for inorganic metal nitride

Department of Chemistry, Ben-Gurion University of the Nagev, ISRAEL — June, 2014—October, 2015
- Shape control synthesis in lead chalcogenides
- SPR tuning of noble metal—metal chalcogenides hybrid nanostructures

EXPERIENCE AS PROJECT ASSISTANT

Department of Chemistry, University of Delhi, Delhi, INDIA-110007, INDIA
Project entitled "Systematic synthetic exploration based on cation and anion variations for the identification and characterization of new solid state materials" funded by **Department of Science and Technology**, **NDIA** — November, 2011—May, 2014

EDUCATION

Ph.D. (Chemistry), University of Delhi, Delhi, India	2012 —2015
M. Phil. (Chemistry), University of Delhi, Delhi, INDIA	2008 —2009
M.Sc. (Inorganic Chemistry), Ch. Charan Singh University, Meerut, INDIA	2005—2007
B.Sc. (Chemistry, Physics, Mathematics) Ch. Charan Singh University, Meerut, INDIA	2002—2005

LIST OF SELECTED PUBLICATIONS

1. Murali Gedda, Emre Yengel, Hendrik Faber, Fabian Paulus, Ming-Chun Tang, Zhang Siyuan, **Prashant Kumar**, Dipti R. Naphade, Yana Vaynzof, George Volonakis, Feliciano Giustino, and Thomas D. Anthopoulos **Ruddlesden-Popper Phase Hybrid Halide Perovskite/ Small-Molecule Organic Blend Memory Transistor**

Adv. Mater. (*Impact factor* **30.8**), 2020, 2003137, 1-9.

2. Shalu Atri, Meenakshi Gusain, **Prashant Kumar**, Sitharaman Uma, Rajamani Nagarajan
Role of the solvent medium in the wet-chemical synthesis of $CuSbS_2$, Cu_3SbS_3 and bismuth substituted Cu_3SbS_3

J. Chem. Sci. (*Impact factor* **1.4**), 2020, 132, 1-8.

3. Bhawna, Akanksha Gupta, **Prashant Kumar**, Adish Tyagi, Ravinder Kumar, Ashwani Kumar, Prashant Singh, R. P. Singh, Vinod Kumar
Facile Synthesis of N-Doped SnO_2 Nanoparticles: A co-catalyst Free Promising Photocatalyst for Hydrogen Generation

ChemistrySelect (*Impact factor* **2.1**), 2020, 5, 7775-7782.

4. Vinod Kumar, Ashish Kumar Choudhary, **Prashant Kumar**, Saurabh Sharma
Nanotechnology: Nanomedicine, Nanotoxicity and Future Challenges

Nanoscience & Nanotechnology-Asia (*Impact factor* = **1**), 2019, 9, 64–78.

5. Prashant Kumar, Mahmud Diab, Kobi Flomin, Pazit Rukesntein, Taleb Mokari
Organic phase synthesis of noble metal-zinc chalcogenide core-shell nanostructures

Colloid. Interface Sci. (*Impact factor* **8**), 2016, 480, 159-165.

6. Meenakshi Gusain, **Prashant Kumar**, Sitharaman Uma, Rajamani Nagarajan
Synthesis of zinc blende $CuInS_2$ and Fe-substituted $CuInS_2$ by the reaction of binary colloids

J. Colloid Surface A (*Impact factor* **4.6**), 2015, 481, 269-275.

7. Prashant Kumar, Meenakshi Gusain, Pandian Senthil Kumar, Sitharaman Uma, Rajamani Nagarajan
A simple one pot synthesis of cubic Cu_5FeS_4

RSC Adv. (*Impact factor* **3.4**), 2014, 4, 52633-52636.

8. Prashant Kumar, Sitharaman Uma, Rajamani Nagarajan
Precursor driven one pot synthesis of Wurtzite and Chalcopyrite $CuFeS_2$

Chem. Commun. (*Impact factor* **6.2**), 2013, 49, 7316-7318.

9. Prashant Kumar, Rajamani Nagarajan, Ritimukta Sarangi
Quantitative X-ray Absorption and Emission Spectroscopies: Electronic Structure Elucidation of Cu_2S and CuS

J. Mater. Chem. C (*Impact factor* **7**), 2013, 1, 2448-2454.

10. Meenakshi Gusain, **Prashant Kumar**, Rajamani Nagarajan
Wurtzite CuInS2: Solution based one pot direct synthesis and its doping studies with non-magnetic Ga^{3+} and magnetic Fe^{3+} ions

RSC Adv. (*Impact factor* **3.4**), 2013, 3, 18863-18871.

11. Prashant Kumar, Meenakshi Gusain, Rajamani Nagarajan
Solvent-mediated room temperature synthesis of highly crystalline Cu_9S_5 ($Cu_{1.8}S$), CuSe. PbS and PbSe from their elements

Inorg. Chem. (*Impact factor* **5.2**), 2012, 51, 7945-7947.
12. Prashant Kumar, Rajamani Nagarajan

An elegant room temperature procedure for the precise control of composition in the Cu-S system

Inorg. Chem. (*Impact factor* **5.2**), 2011, 50, 9204–9206.

13. Prashant Kumar, Meenakshi Gusain, R. Nagarajan
Synthesis of $Cu_{1.8}S$ and CuS from Copper-Thiourea Containing Precursors; Anionic (Cl^-, NO_3^-, SO_4^{2-}) Influence on the Product Stoichiometry

Inorg. Chem. (*Impact factor* **5.2**), 2011, 50, 3065–3070.

14. Ratan Lal, Anukriti Sharma, Tripti Gour, Lokesh Kumar Agarwal, Yogesh Kumar Sharma, Siva P.K. Chetri, Rajesh Kumar, **Prashant Kumar**, Amit Kumar Sharma, Kuldeep Sharma
Biogenic Production of Eco-Friendly Arjuna-ZnO NPs for Sunlight-Activated Efficient Degradation of Organic Dyes of High Commercial Usages

J. Saudi Chem. Soc. 2024, 28, 101851.

LIST OF CONFERENCES

1. Prashant Kumar, Murali Gedda, Kalaivanan Loganathan, Dipti Naphade, Abhinav Sharma, Hendrik Faber, Emre Yengel, Leonidas Tsetseris and Thomas D. Anthopoulos

"Solution processed copper sulfide based resistive switching devices"

Presented at: 2019 MRS Fall Meeting & Exhibit | (1 - 6 December, 2019), Boston - Materials Research Society, USA.

2. Prashant Kumar, Hendrik Faber, Kalaivanan Loganathan, Yuliar Firdaus, Emre Yengel, Thomas D. Anthopoulos
"Facile solution synthesis of V-VI-VII inorganic semiconductors and their potential for applications in electronic devices"

Presented at: 2018 MRS Fall Meeting & Exhibit | (25 - 30 December, 2018), Boston - Materials Research Society, USA

3. Prashant Kumar, Sitharaman Uma, Rajamani Nagarajan
"Precursor driven one pot synthesis of Wurtzite and Chalcopyrite $CuFeS_2$"

Presented at: International Union of Materials Research Societies–International Conference in Asia 2012 (IUMRS-ICA 2013) | (16 – 20 December 2013), Indian Institute of Science, Bangalore, India.

4. Prashant Kumar, Sitharaman Uma, Rajamani Nagarajan
"**A simple unconventional approach for composition control in Copper-Iron-Sulfur system"**

Presented at: International Union of Materials Research Societies–International Conference in Asia 2012 (IUMRS-ICA 2012) | (26 – 31 August 2012), BEXCO, Busan, South Korea.

5. Prashant Kumar, Meenakshi, Rajamani Nagarajan
"Synthesis of Cu S and CuS from Copper-Thiourea Containing Precursors; Anionic (Cl^-, NO^-, SO_4^{2-}) Influence on the Product Stoichiometry"

Presented at: INDO-US meeting on New Functional Material: Synthesis, Preparation and Methods | (2 - 6 June 2011) Manali (H.P.) India.

6. Prashant Kumar, Vaishali Thakral, Rajamani Nagarajan "**Synthesis of Fe_3S_4 and FeS_2 using a single solvent system"**

Presented at: International Conference on Frontiers in Inorganic Chemistry (FIC-2010) | (11-13 December 2010) Indian Association of Chemical Sciences (IACS), Kolkata. India.

TECHNICAL SKILLS

Synthesis process	Solution base synthesis, Solvothermal synthesis, Hot Injection method, Colloidal reflux method, Solid State synthesis, Flux method, Waves assisted synthesis including ultra-sonication and microwave synthesis, Synthesis of materials using Schlenk line. Solvent based synthesis and film deposition under Glove box environment, in-situ thin film deposition in glove box, thermal deposition of thin films, photo thermal thin film deposition, thin film deposition using thermal evaporator
Micro fabrication Process	Solution Processed thin film deposition, Plasma Etchning, Thermal Evaporator, Thermal oxidation
Device characterization tools and techniques	Profilometer, Reflectometer, Four point probe station, Semi-automated probe station, FT-IR, UV-VIS, PXRD, XPS, HAADF-TEM, HRTEM, STEM, TEM-SAED, SEM, PL, Raman spectroscopy and Magnetic measurements. Origin, ImageJ, Powder X, Powder cell, TOPAS, Diamond, Fullprof. Chem Draw and INDEX (Softwares used for the structural investigation, refinement and presentation of chemical compounds).

AWARDS

Prof. C. Mahadevan Mineral Engineering Science Award (MESA)-conferred by Mineral Engineering Science Association, India.	2014
Selected for Senior Research Fellowship (SRF) - by Council of Scientific and Industrial Research (CSIR), India.	2014

Membership

Materials Research Society (MRS), USA
Materials Chemistry Group, Department of Chemistry, University of Delhi, Delhi, INDIA

Prashant Kumar

April, 2024

Muzaffarnagar, UP, INDIA