

Dr. Sachin Rawalekar, *Ph.D.*

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Objective

To be involved in cutting edge research in innovative and challenging areas of catalysis, specialty inorganic chemicals, petrochemicals and nanotechnology by utilizing my analytical and material synthesis skills and developing strategies of new chemistry.

Summary

- Expertise in synthesis of metal, metal oxide nanoparticles, semiconductor nanocrystals, graphene oxide, hybrid nanostructures and nano-composites with controlled dimensions.
 - Good understanding in optical properties and catalytic activities of nanomaterials.
 - Highly experienced in synthesis of metal organic frameworks and their application in separation, catalysis, gas storage and removal of toxic impurities from hydrocarbon feed.
 - Experienced in application of refinery sulphur as a fertilizer for agriculture applications.
 - Expertise in recovery of precious metals from spent heterogeneous catalysts.
 - Motivated to exploit the nanomaterials for morphology dependent product selective catalysis in synthesis of oil, gas and petrochemical products.
 - Proficient in carrying out high pressure reactions.
 - Experienced with impurity identification from ethylene glycol manufacturing plant by chromatographic methods.
 - Well versed with analytical instruments like UV-vis spectrophotometer, fluorescence spectrophotometer, GC-MS, x-ray diffraction, thermal analysis, time correlated single photon counting technique, ultrafast transient absorption spectrophotometer, transmission electron microscope and cyclic voltammetry.
 - Excellent interpersonal, communication, presentation and networking skills.
 - Strong organizational skills; good knowledge of English, written and oral.
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Research Interests:

- Synthesis of metallic, bi-metallic, metal oxide nanoparticles, semiconductor nanocrystals and hybrid nanostructures with controlled aspect ratio and their applications.
 - Aspect ratio dependent product selective catalytic applications of nanocatalysts in synthesis of oil, gas products and petrochemicals.
 - Surface functionalization of heterogeneous catalyst to enhance their catalytic performance.
 - Conversion of CO₂ into value added products
 - Graphene synthesis, its functionalization and their optoelectronic applications.
 - Synthesis of metal organic frameworks and their application in gas storage, gas separation, catalysis, separation of hydrocarbons and for selective adsorption of impurities from hydrocarbon feed.
 - Synthesis of sulphur-based composites and their high-end applications.
 - High pressure catalytic reactions.
 - Impurity identification by spectroscopic techniques.
 - Photocatalysis by nanocrystals and their hybrid nanostructures.
 - Optoelectronic and photovoltaic applications of nanostructures.
 - Charge transport and electronic properties of nanomaterials.
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Key Accomplishments

- Successfully *synthesized* metal, bi-metallic, composite nanoparticles and studied their optical and catalytic properties.
- *Developed* a *method* successfully for surface functionalization of heterogeneous catalyst.
- *Developed and Scaled up* a method for recovery of precious metals from spent heterogeneous catalysts.
- *Synthesized* metal organic frameworks with good surface and textural properties.
- *Developed* a method for arsine adsorption by MOFs. Set-up for arsine adsorption was designed and installed at RTG Mumbai.
- *Developed and scaled up* a method for synthesis of sulphur-based fertilizers.
- *Developed* a method for impurity identification in EG manufacturing plant.
- *Successfully* developed an adsorbent for propane-propene separation.
- Published *fourteen* research articles in peer reviewed journal of international repute.
- Inventor of *six* invention disclosures.
- *Thirteen* internal technical reports were transcribed on the projects while

working at Reliance Industries Limited.

- *Guided* M.Tech student for project.
- Experience on *setting-up* of new R&D laboratory with all safety protocols.
- *Reviewer* of international journals
- Delivered an *invited* talk in national seminars.

Professional Experience

May, 2013- **Manager-Research Scientist**

Current *Reliance Industries Limited, Mumbai, Maharashtra, India.*

- Recovery of precious metals from spent catalysts.
- Surface modification of heterogeneous catalyst and evaluation of their catalytical activity.
- Synthesis of metal organic frameworks and their applications in gas storage, separation of xylene isomers and removal of toxic impurities from hydrocarbon feed.
- Development of adsorbents for propane-propylene separation.
- Synthesis of catalytic, porous, magnetic and photochromic nanomaterials.
- Synthesis of sulphur-based composites and their applications for value addition of refinery sulphur.
- Impurity identification from ethylene glycol manufacturing plant by chromatography.
- Conversion of CO₂ to value added products
- Synthesis of *para* toluic acid by toluene carboxylation at supercritical conditions.
- Responsible for R and D activities including planning, designing of experiments.
- Accountable for preparation of technical reports and invention disclosures.
- Active participation in research projects with multi-level, cross-functional team across the organisation.
- Involved in safety related activities, house-keeping, self-development trainings and programs.
- Safety co-ordinator for chemical synthesis laboratory.
- Responsible for preparation of standard operating procedure for experimental set ups in laboratory.

Oct-2011- **Postdoctoral Researcher**

Sep 2012 *Ben-Gurion University of the Negev, Beer-Sheva, Israel.*

- Synthesized metal nanoparticles, composites, anisotropic nanocrystals and the hybrid nanostructures with controlled aspect ratio.
- Studied optical and electronic properties of nanomaterials.
- Analysed nanomaterials by cyclic voltammetry
- Prepared research articles and technical reviews.
- Actively involved as reviewer of scientific journals
- Involved in various safety related activities and housekeeping.

Oct, 2006- Research Fellow

Oct, 2011 *Bhabha Atomic Research Centre, Mumbai, India.*

- Gained knowledge about synthesis of nanomaterials and their optical and electronic properties.
- Developed an understanding in laser spectroscopy.
- Synthesised metal, metal oxide, composite nanoparticles, semiconductor nanocrystals and hybrid nanostructures with controlled aspect ratio.
- Characterized nanocrystals with XRD, UV-Vis spectroscopy, fluorescence spectroscopy, transmission electron microscopy, time correlated single photon counting and ultrafast transient spectroscopy.
- Studied the influence of aspect ratio of nanomaterials on their optical and electronic properties.
- Developed understanding in effect on trap states on carrier cooling and charge transfer dynamics in hybrid nanostructures.
- Collected, analysed and interpreted experimental data.
- Prepared research articles and technical reviews.
- Involved in safety related activities and housekeeping.
- Responsible for daily maintenance of instruments.
- Involved in technical discussion with collaborators.

Aug, 2005- Lecturer/Assistant Professor

Sep, 2006 *Chemistry Department, Fergusson college, Pune, India.*

- Conducted lecture and practicles for undergraduate and postgraduate students.

Awards and Fellowships

- *47th National Safety Day Award* by Reliance Technology Group, Reliance Industries Limited for contribution in safety for the year 2017-18.

- *Individual Excellence Award* by Chemical Synthesis and Catalysis group, Reliance Industries Limited for valuable contribution towards research programs during year 2016-17.
 - *Team Excellence Award* by Chemical Synthesis and Catalysis group, Reliance Industries Limited for contribution towards lab safety champions for chemical synthesis and catalysis group during the year 2016-17.
 - *46th National Safety Day Award* by Reliance Technology Group, Reliance Industries Limited for contribution in safety for the year 2016-17.
 - *Out of Box Idea* award by Reliance Industries Limited during rewards and recognition function by Reliance Technology Group-2014.
 - *Post-doctoral fellowship* awarded by Ben-Gurion University of the Negev, Beer sheva, Israel.
 - *Junior research fellowship* awarded by the Department of Atomic Energy (DAE), Government of India, 2006 for pursuing doctoral research.
 - *Senior research fellowship* awarded by the Department of Atomic Energy (DAE), Government of India, 2008 for pursuing doctoral research.
 - *Best poster award* awarded by Indian Society for Radiation & Photochemical Sciences (NSRP 2009) at Nanital, Uttarakhand, India-February, 2009.
 - *Best poster award* awarded by Indian Society for Radiation & Photochemical Sciences (NSRP 2011) at Jodhpur, Rajasthan, India-March, 2011.
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Publications

1. *Interfacial Electron Transfer Dynamics in Quinizarin Sensitized ZnS Nanoparticle: Monitoring Charge Transfer Emission*
Sachin Rawalekar, S. Verma, Sreejith K., H. N. Ghosh, *Langmuir*, **2009**, 25(5), 3168.
(Cited 8 times)
2. *Ultrafast Charge Carrier Relaxation and Charge Transfer Dynamics CdTe/CdS Core-Shell Quantum Dots as Studied by Femtosecond Transient Absorption Spectroscopy* **Sachin Rawalekar**, Sreejith K, S. Verma, H. N. Ghosh, *J. Phys. Chem. C*. **2010**, 114(3), 1460.
(Cited 73 times)
3. *Surface State Mediated Charge Transfer Dynamics in CdTe/CdSe Core-Shell Quantum Dot*
Sachin Rawalekar, Sreejith K. , S. Verma, H. N. Ghosh, *Chem. Phys. Chem.*, **2011**, 12(9),1729. (Cited 11 times)
4. *Effect of Surface State on Charge Transfer Dynamics in Type II CdTe/ZnTe Core-Shell Quantum Dots: A Femtosecond Transient Absorption Study*

- Sachin Rawalekar**, Sreejith K., S. Verma, H. N. Ghosh, *J. Phys. Chem. C*, **2011**, 115(25), 12335. (Cited 13 times)
5. *Synthesis and Optical Properties of Type I CdSe/ZnSe Core-Shell Quantum Dot*
Sachin Rawalekar, M. Venkata Nikhil Raj, H. N. Ghosh, *Science of Advanced Materials*, **2012**, 4(5-6), 637. (Cited 7 times)
 6. *Rational Design of Hybrid Nanostructures for Advanced Photocatalysis*
Sachin Rawalekar, Taleb Mokari, *Advanced Energy Materials*, 2013, 3 (1), 12. (Cited 70 times)
 7. *Charge Carrier Dynamics in Thiol Capped CdTe Quantum Dots*
Sreejith K., **Sachin Rawalekar**, S. Verma, D. K. Palit, H. N. Ghosh, *Phys. Chem. Chem. Phys.*, **2010**, 12, 4210. (Cited 50 times)
 8. *Ultrafast Hole Transfer in CdSe/ZnTe Type II Core Shell Nanostructure*
Sreejith K., **Sachin Rawalekar**, S. Verma, H. N. Ghosh, *J. Phys. Chem. C*, **2011**, 115(5), 1428. (Cited 40 times)
 9. *Ultrafast Relaxation Dynamics in Graphene Oxide: Evidence of Electron Trapping*
Sreejith K., S. N. Achary, **Sachin Rawalekar**, H. N. Ghosh, *J. Phys. Chem. C*, **2011**, 115(39), 19110. (Cited 47 times)
 10. *Interfacial Electron Transfer Dynamics of Two Newly Synthesized Catecholate Bound Ru-II Polypyridyl-Based Sensitizers on TiO₂ nanoparticle surface: A Femtosecond Pump Probe Spectroscopic Study.*
T. Banerjee, **Sachin Rawalekar**, A. Das, H. N. Ghosh, *Euro. J. Inorg. Chem.*, **2011**, 27, 4187. (Cited 13 times)
 11. *Does Bridging Geometry Influence Interfacial Electron Transfer Dynamics? Case of Endiol-TiO₂ system*
Sreejith K., **Sachin Rawalekar**, A. Sen, B. Ganguly, H. N. Ghosh, *J. Phys. Chem. C*, **2012**, 116(1), 98. (Cited 11 times)
 12. *Ultrafast Charge Transfer Dynamics in Photoexcited CdTe Quantum dot decorated on Graphene*
Sreejith, K. **Sachin Rawalekar**, H. N. Ghosh, *J. Phys. Chem., C*, **2012**, 116, 16271. (Cited 30 times).
 13. *Charge Carrier Cascade in Type II CdSe/CdTe Graded Core-Shell Interface*
Sreejith K. **Sachin Rawalekar**, H. N. Ghosh, *J. Mater. Chem. C*, **2013**, 1, 2755. (Cited 11 times).

14. Spectroscopy and Femtosecond Dynamics of Water Soluble Type I CdSe/ZnS Core-Shell Quantum Dot,
Pallavi Singhal, **Sachin Rawalekar**, Sreejith Kaniyankandy, H. N. Ghosh, *Science of Advanced Materials*, 2013, 5(10), 1354. (Cited 5 times).
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Manuscript submitted/under preparation

15. Exciton dissociation in CdS QDs by electron transfer to Coumarin-343
Sreejith K. **Sachin Rawalekar**, H. N. Ghosh, under preparation
16. Metal organic frameworks: A new class of photocatalyst,
Sachin Rawalekar, Kalpana G. R. V. Jasra, under preparation
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Conference Proceedings: 09

List of Conference Attended/Presented Poster

- Trombay Symposium of Radiation and Photochemistry (TSRP), YASHDA, Pune. January 10-15, **2008**.
Poster Title: Interfacial Electron Transfer Dynamics in Quinizarin Sensitized ZnS nanoparticles: Monitoring Charge Transfer Emission.
- 2nd DAE-BRNS International Symposium on Materials Chemistry (ISMC), Mumbai, India. December 2-6, **2008**.
Poster Title: Charge Carrier Dynamics in Thiol Capped Quantum Dots.
- National Symposium on Radiation and Photochemistry (NSRP-2009), Department of Physics, Kumaun University, Nainital-263001, India. March 12-14, **2009**.
Poster Title: Synthesis and Optical Properties of Water Soluble Type II CdTe/CdS Core/Shell Quantum Dots. (Best Poster Award)
- International Conference on Advanced Nanomaterials and Nanotechnology, Centre for nanotechnology, Indian Institute of Technology Guwahati, India. December 9-11, **2009**.
Poster Title: Ultrafast Charge Carrier Dynamics in CdTe/CdS Core-shell Quantum Dots as Studied by Femtosecond Transient Absorption Spectroscopy.
- 3rd Asia Pacific Symposium of Radiation Chemistry (APSRC-2010) and DAE BRNS 10th Biennial Trombay Symposium of Radiation and Photochemistry (TSRP-2010), Lonavala, Maharashtra, India. September, 14-17, **2010**. *Poster Title: Ultrafast Charge Transfer Dynamics of CdTe/ZnTe Core-Shell QD: Effect of Surface State.* National Symposium on Radiation and Photochemistry (NSRP-2011),

Department of Chemistry, JNV University, Jodhpur, Rajasthan, 342005, India.
March 10-12, **2011**.

Poster Title: *Surface State Mediated Ultrafast Charge Transfer Dynamics in CdTe/CdSe core-shell Quantum Dots. (Best Poster Award)*

- 4th International Conference on Metal Organic Frameworks and Open Frameworks Compounds (MOF-2014) at Kobe, Japan. September 28th -2nd October, 2014.
- Conference on challenges in organic materials and supramolecular chemistry ISACS-15 at Indian Institute of Science, Bangalore, India, November, 19-21st, 2015.
- National conference on supramolecules and forensic nanotechnology, Gujarat University of Forensic Science, Gandhinagar, 8th-9th January, 2016.

Patents:

- A process for modifying a heterogeneous catalyst with chemical compound, systems and compound thereof (US20170216829A1, in process)
- Novel process for surface modification of alkane dehydrogenation catalyst. (under preparation)
- Additivated polyolefins and process for their preparation during olefin polymerization
- Development of novel process for preparation of water dispersible sulphur fertilizer with multi-functional activity.
- Eco-friendly innovative process for producing sodium carbonate using carbon dioxide emitted from industrial sources.
- A method for selectively removal of arsine from hydrocarbon feed using metal organic frameworks

Personal details

Name	: Dr. Sachin Rawalekar
Date of Birth	: 02/12/1982
Nationality	: Indian
Sex	: Male
Marital Status	: Married

I declare that the information given above is true and correct to the best of my knowledge.

Dr. Sachin Rawalekar.