
Dr.Rohit Kumar Rana

Principal Scientist

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Bibliography

About

Dr. Rohit Kumar Rana received his doctorate in Chemistry from Indian Institute of Technology Madras in 1999. Before joining Indian Institute of Chemical Technology, Hyderabad in 2005, he was a postdoctoral researcher at the Chemistry Department of Bar-Ilan University in Ramat-Gan (Israel) and the Department of Chemical Engineering, Rice University, Houston (USA). His main research interest concerns bio-inspired materials science, carbon nanotube synthesis, sonochemical methods to prepare nanoscale materials and heterogeneous catalysis.

Education

Ph.D. (Chemistry)
Indian Institute of Technology Madras, Chennai, 2000

Employment

Principal Scientist: 27th Jan 2011 – onwards;
Senior Scientist: 27th Jan 2008 – 26th Jan 2011;
Scientist: 27th Jan 2005 – 26th Jan 2008;
Indian Institute of Chemical Technology (CSIR-IICT)
(A constituting laboratory of Council of Scientific and Industrial Research, India)
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Research Interests

Present Research

- Mimicking Biomineralization routes to synthesize functional materials.
- Nanoparticle-assembly to form nano-structured materials.
- Synthesis of materials with hierarchical structures, mesostructures, vesicles etc.
- Sonochemical synthesis of nanomaterials.
- Heterogeneous catalysis
- Light induced properties: Photocatalysis, sensor and dye sensitized solar cell
- Nanomaterials in Biology: Encapsulation and release of drugs, dyes and enzymes

Past Research

- Catalytic thermal decomposition methods for the synthesis of carbon nanotubes.
- Synthesis of magnetic metal encapsulated carbon nanoflasks.
- Sonochemical synthesis of nanoparticles and mesostructured materials using nanoparticles as the building blocks.
- Synthesis of mesoporous silica vesicles.
- Synthesis of microcapsules and their use in encapsulation applications.
- Encapsulation and controlled release of enzymes.
- Encapsulation of drugs and dyes in microcapsules.
- Biomineralization: silicification induced by polyamines
- Hydrothermal synthesis and characterization of Mo and Ti Substituted MCM-41 type mesoporous silicates.
- Liquid phase heterogeneous catalytic oxidation of cyclohexanol and styrene.
- High-pressure liquid phase catalytic oxidation of cyclohexane.
- Quantum chemical calculations on cluster models representing transition metal substituted sites in Zeolites.

Projects Involved

1. Polyamine mediated assembly of silica nanoparticles to make functional materials and implications for biosilicification, Principal Investigator, DST, India Nanomission, Sept 2011.
2. Advancing the efficiency and production potential of excitonic solar cells (APEX), Co-Investigator, DST, India & RC, UK, Jan 2011.
3. Dye Sensitized Solar Cell (DSSC)/Quantum dot dye sensitized solar cell (TAP-SUN, Co-Investigator, MNRE, New Delhi, Apr 2012.
4. Nanomaterials: Applications & Impact on Safety, Health & Environment (NanoSHE), Co-Investigator, CSIR XII FYP, Apr 2013.
5. Molecules to Materials to Devices (M2D), Co-Investigator, CSIR XII FYP, Apr 2013.
6. Intelligent Coatings (Intelcoat), Co-Investigator, CSIR XII FYP, Apr 2013.

Research Group Members

- Dr. Gousia Begum, DST Young Scientist
- Mr. Bikash Sharma, SRF
- Ms. N. Shilpa, SRF
- Mrs. Songhita Meher, SRF
- Ms. Arockya Josmila, MSc Chemistry, St. Joseph's College, Trichy, INSA Summer Research Fellow

Publications

- G. Begum, T. Naveen Reddy, K. P. Kumar, K. Dhevendar, S. Singh, M. Amarnath, S. Misra, V. K. Rangari, and R. K. Rana* An in situ Strategy to Encapsulate Antibiotics in a Bio-inspired CaCO₃ Structure Enabling pH-Sensitive Drug Release Apt for Therapeutic and Imaging Applications ACS Appl. Mater. Interfaces, 2016, 8 (34), 22056–22063
- Rakesh Chilivery and Rohit Kumar Rana* Microcapsule Structure with Tunable Textured Surface via Assembly of Polyoxomolybdate Clusters: A Bio-inspired Strategy and Enhanced Activities in Alkene Oxidation ACS Appl. Mater. Interfaces, 2017, 9 (3), 3161–3167
- N. Shilpa, J. Manna, P. Rajput, and R. K. Rana* Water Oxidation Catalyst via Heterogenization of Iridium Oxides on Silica: A Polyamine-Mediated Route To Achieve Activity and Stability ACS Catal., 2016, 6, 5699–5705
- A. J. Amali, N. H. Awwad, Rohit K. Rana* and D. Patra* Nanoparticle assembled microcapsules for application as pH and ammonia sensor, Anal. Chim. Acta 2011, 708, 75– 83. (Highlighted in Nature India, doi:10.1038/nindia.2011.154; Published online 29 October 2011).
- A. J. Amali, P. Saravanan and Rohit K. Rana*, Tailored anisotropic magnetic chain structures hierarchically assembled from magnetoresponse and fluorescent components, Angew. Chem. Int. Ed. 2011, 50 (6), 1318 –1321. (Selected article under Hot Topics on Magnetic Materials).

Patents

- Multifunctional calcium carbonate microstructures useful in encapsulation applications and a process for the preparation thereof, R. K. Rana, G. Begum, USA Patent, US9233084 B2.

Lectures

- Rohit K. Rana, Bio-inspired Strategies to Hierarchical Assembly Creating Functional Nanostructured Materials, Invited Speaker, National Symposium on Convergence of Chemistry & Materials (CCM-2017) BITS Pilani, Hyderabad Campus, December 21-22, 2017.
- Rohit K. Rana Assembly of Magnetic Nanoparticles: Bio-inspired Strategy to Create Functional Materials, Guest Speaker at Akita University, Japan, October 14, 2016.
- Rohit K. Rana, Microcapsule Structures for Removal of Arsenate and Chromate from Water: A Bio-inspired Approach, OCS Conference, IGIT, Sarang, Odisha, Dec 24, 2015.
- Rohit K. Rana, Polyamine-mediated Assembly of Silica Nanoparticles to make Catalytic Functional Materials, DST Nanomission project review Meeting (NANOINDIA-2015), Sastra University, Thanjavur, Jan 31 – Feb 01, 2015.
- Rohit K. Rana, Bio-inspired Approach to Tune Silica Nanoparticle-Assembled Microcapsules for Removal of Arsenate and Chromate from Water, A. P. Science Congress – 2013 (APSC-2013), University of Hyderabad, November 14 – 16, 2013.