CURRICULUM VITAE

Kanishka Biswas

Postdoctoral Research Scholar

Prof. Mercouri G. Kanatzidis Group

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ACADEMIC PROFILE

Postdoctoral Research (Supervisor Prof. Mercouri G. Kanatzidis) June, 2009-current

Place of research: Department of Chemistry, Northwestern University, Evanston, Illinois, US

Area of research: 1] Thermoelectric materials based on PbTe for energy generation. **2]** Synthesis of new chalcogenides frame work in ionic liquid media.

Ph. D (Chemistry, Supervisor Prof. C. N. R. Rao) 2006- 2009

Ph. D. Thesis Title: Synthesis, Characterization, Properties and Growth of Inorganic Nanomaterials.

Place of research: Solid State & Structural Chemistry Unit, Indian Institute of Science, Bangalore, India

Area of research: 1] Soft chemical synthesis and characterization (structural, thermal, optical and magnetic) of nanostructures (nanocrystals, nanorods, thin films) of various oxide (ReO_3, RuO_2, IrO_2 and ZnO); chalcogenides (CdS, CdSe, ZnS, ZnSe, PbS and PbSe) and nitride (GaN and InN). **2]** Growth kinetics study of various nanostructures by the use of small-angle X-ray scattering (SAXS), transmission electron microscopy (TEM), UV-visible/ photoluminescence spectroscopy and isothermal titration calorimetry (ITC). **3]** Surface-enhanced Raman spectroscopy (SERS) studies based on ReO_3 and other metallic nanostructure. **4]** Use of organic-aqueous interface to synthesize various inorganic nanostructures.

M. S. (Chemistry) 2003-2006

M. S. Project Report Title (Supervisor Prof. C. N. R. Rao) Investigation of nanocrtystals of MnO, ReO_3, RuO_2, IrO_2 and Mn-doped GaN.

Place of research: Solid State & Structural Chemistry Unit, Indian Institute of Science, Bangalore, India

Summer Research Project (Under guidance of Prof. S. B. Krupanidhi) May, 2004

Place of research: Materials Research Center, Indian Institute of Science, Bangalore, India

Project: Preparation Mn-doped ZnO thin films by RF magnetron sputtering and pulsed laser deposition and their various electrical characterizations at the Material Research Centre has been carried out.

B. Sc (Honors in Chemistry) 2000-2003

Place of study: Jadavpur University, Kolkata, India

RESEARCH INTERESTS

- Thermoelectric materials for energy generation
- Solid state chemistry based on inorganic materials
- Synthesis, growth and characterization of inorganic nanomaterials
- Use of Organic-aqueous interface to synthesize various nanomaterials
- SAXS and other X-ray related techniques based on nanomaterials
- Solubilization and functionalization of nanomaterials
- Inorganic chemistry of metal chalcogenides in ionic liquid media.
- Chemistry related to carbon nanotubes and graphene

RESEARCH EXPERIENCES

Synthesis

- Expertise in sealed tube high temperature furnace reaction.
- Expertise in Solvothermal/hydrothermal reaction.
- Expertise in the area of organic- aqueous interface to synthesize various inorganic nano-crystalline thin films.
- Expertise in synthesis of inert material in glove box.
- Experienced in solid state synthesis by programmable furnase, use of schlenk line and vacuum sealing line, liquid ammonia reaction, arc-melting and induction furnace reaction.

Characterizations

- Routine characterizations by powder X-ray diffraction, UV-vis spectroscopy, PL measurement, IR, SEM, TEM, TGA, DTA, Isothermal titration calorimetry and other means.
- Expertise in SAXS to study the in-situ growth of nanostructures.
- Experienced in the area of surface-enhanced Raman spectroscopy (SERS) and other Raman spectroscopy measurements.
- Experienced in electrical characterization (resistivity and thermopower) by ULVAC-RIKO-ZEM3 and in thermal conductivity measurements by flash diffusivity method in a NETZSCH LFA 457 MicroFlash instrument.
- Experienced in the use different synchrotron X-ray measurements (Reflectivity and Grazing angle diffraction).

AWARDS AND FELLOWSHIPS

- **Postdoctoral fellowship,** Northwestern University (2009).
- **Best talk award,** Unit day of Solid State Structural Chemitry Unit, IISc, Bangalore (2008)
- **Excellent grade [S, 8 out of 8 TGPA (term grade point average)],** MS project (2006).
- **1st position in four semesters (7.3 out of 8 CGPA, cumulative grade point average),** MS from IISc (2006).
- Council of Scientific Industrial Research (CSIR)-University Grant Commission (UGC) **National Eligibility Test (NET)** for Junior Research Fellowship (JRF) and eligibility for lectureship (June, 2005).
- **Selected for Integrated Ph. D Program in Chemistry,** IISc (2003).

- **Selected for M. Sc. Program in Chemistry**, Indian Institute of Technology Kanpur (IITK) and Indian Institute of Technology Kharagpur (IITKGP) (2003).
- **3rd position** with first class (76 % marks); B. Sc degree from Jadavpur University, Kolkata (2003).

LIST OF PUBLICATIONS

Research paper

1. "Small-angle X-ray scattering study of the aggregation of gold nanoparticle duringformation at the toluene-water interface." M. K. Bera, M. K. Sanyal, L. Yang, **Kanishka Biswas**, A. Gibaud and C. N. R. Rao, *Phys. Rev. B* (accepted).
2. "Viscoelastic Properties of Nanocrystalline Films of Semiconducting Chalcogenides at Liquid/Liquid Interface." Rema Krishnaswamy, K. P. Kalyanikutty, **Kanishka Biswas**, A. K. Sood and C. N. R. Rao, *Langmuir* **2009**, 25, 10954.
3. "Surface-enhanced Raman scattering of molecules adsorbed on nanocrystalline Au and Ag films formed at the organic-aqueous interface." Barun Das, Urmimala Maitra, **Kanishka Biswas**, Neenu Varghese and C. N. R. Rao, *Chem. Phys. Lett.*, **2009**, 477, 160.
4. "Nanostructured Peptide Fibrils Formed at the Organic-Aqueous Interface and Their Use as Templates to Prepare Inorganic Nanotubes." **Kanishka Biswas** and C. N. R. Rao, *ACS Applied Materials & Interfaces*, **2009**, 1, 811.
5. "Nanocrystalline Janus films of inorganic materials prepared at the liquid-liquid interface." **Kanishka Biswas** and C. N. R. Rao, *J. Colloid Interface Sci.*, **2009**, 333, 404.
6. "Investigations of the Growth Kinetics of Capped CdSe and CdS Nanocrystals by a Combined Use of Small Angle X-ray Scattering and Other Techniques." Neenu Varghese, **Kanishka Biswas** and C. N. R. Rao, *Chem. Asian J.* **2008**, 3, 1435.
7. "Growth Kinetics of nanocrystals and nanorods by employing small-angle X-ray scattering (SAXS) and other techniques." **Kanishka Biswas**, Neenu Varghese and C. N. R. Rao, *J. Mater. Sci. Technol.*, **2008**, 24, 615.
8. "Growth Kinetics of Gold Nanocrystals: A Combined Small Angle X-ray Scattering and Calorimetric Study." **Kanishka Biswas**, Neenu Varghese and C. N. R. Rao, *Small*, **2008**, 4, 649.
9. "Growth Kinetics of ZnO Nanorods: Capping-dependent Mechanism and Other Interesting Features." **Kanishka Biswas**, Barun Das and C. N. R. Rao, *J. Phys. Chem. C*, **2008**, 112, 2404.
10. "Use of Ionic Liquids in the Synthesis of Nanocrystals and Nanorods of Semiconducting Metal Chalcogenides." **Kanishka Biswas** and C. N. R. Rao, *Chem. Eur. J.*, **2007**, 13, 6123.
11. "Pressure-induced phase transitions in nanocrystalline ReO_3." **Kanishka Biswas**, D. V. S. Muthu, A. K. Sood, M. B. Kruger, B. Chen and C. N. R. Rao, *J. Phys: Condense Mater.*, **2007**, 19, 436214.
12. "Surface-Enhanced Raman Spectra of Aza-aromatics on Nanocrystals of Metallic ReO_3." **Kanishka Biswas**, S. V. Bhat and C.N.R.Rao, *J. Phys. Chem. C*, **2007**, 111, 5689.
13. "Core–shell nanoparticles based on an oxide metal: ReO_3@Au (Ag) and ReO_3@SiO_2 (TiO_2)." Sandeep Ghosh, **Kanishka Biswas** and C.N.R.Rao, *J. Mater. Chem.*, **2007**, 17, 2412.

14. "Synthesis and characterization of nanocrystals of the oxide metals, RuO_2, IrO_2 and ReO_3." **Kanishka Biswas** and C. N. R. Rao, *J. Nanosci. Nanotech.*, **2007**, 7, 1969.
15. "Synthesis and optical properties of In-doped GaN nanocrystals." S. V. Bhat, **Kanishka Biswas** and C. N. R. Rao, *Solidstate Commun.*, **2007**, 141, 325.
16. "Soft Chemical Approaches to Inorganic Nanostructures." C. N. R. Rao, Ved Varun Agrawal, **Kanishka Biswas**, Ujjal K Gautam, Moumita Ghosh, A. Govindaraj , G. U. Kulkarni, K. P. Kalyanikutty, Kripasindhu Sardar and S. R. C Vivekchand, *Pure and Applied Chemistry*, **2006**, 78, 1619.
17. "Use of Fluorous Chemistry in the Solubilization and Phase Transfer of Nanocrystals, Nanorods, and Nanotubes." Rakesh Voggu, **Kanishka Biswas**, A. Govindaraj and C. N. R. Rao, *J. Phys. Chem. B* **2006**, 110, 20752.
18. "Ferromagnetism in Mn-doped GaN nanocrystals prepared solvothermally at low temperatures." **Kanishka Biswas**, Kripasindhu Sardar and C. N. R. Rao, *App. Phys. Lett.* **2006**, 89, 132503.
19. "Metallic ReO_3 Nanoparticles." **Kanishka Biswas** and C. N. R. Rao, J. *Phys. Chem. B* **2006**, 110, 842.
20. "MnO and NiO nanoparticles: synthesis and magnetic properties." Moumita Ghosh, **Kanishka Biswas**, A. Sundaresan and C. N. R. Rao, *J. Mater. Chem.* **2006**, 16, 106.

Review, Highlight and Perspective

21. "Graphene, the new nanocarbon" C. N. R. Rao, **Kanishka Biswas**, K. S. Subrahmanyam and A. Govindaraj, *J. Mater. Chem. (Highlight)* **2009**, 19, 2457.
22. "Characterization of nanomaterials by physical methods." C. N. R. Rao and **Kanishka Biswas**, *Annual Review of Analytical Chemistry* **2009**, 2, 435.
23. "Synthesis of Inorganic Nanomaterials." C. N. R. Rao, S. R. C Vivekchand, **Kanishka Biswas** and A. Govindaraj, *Dalton Trans. (Perspective)* **2007**, 3728.

Book chapter

24. "Metal Oxide Nanostructures: Synthesis, Properties and Applications." **Kanishka Biswas**, Chandra Sekhar Rout and C. N. R. Rao in "Metal oxide nanostructures and their applications" Eds. Ahmad Umar and Yoon-Bong Hahn American Scientific Publisher (in print)
25. "Use of Ionic Liquids, Liquid-Liquid Interfaces and Other Novel Methods for the Synthesis of Inorganic Nanocrystals." **Kanishka Biswas** and C. N. R. Rao, in "Recent Advances in Solution-based Chemical Synthesis of Semiconductor, Metal, and Oxide Nanocrystals" Eds. P. Davide Cozzoli, Research Signpost, **2009**.

LIST OF PRESENTATION (ORAL AND POSTER) IN CONFERENCES, SCHOOL AND WORKSHOP

1. **Poster:** "Nanostructured Peptide Fibrils Formed at the Organic-Aqueous Interface and Their Use as Templates to Prepare Inorganic Nanotubes." **Joint India-US Workshop on Scalable Nanomaterials for Enhanced Energy Trasport, Conversion and Efficiency, 19-20 Aug, 2008, Bangalore, India.**
2. **Poster:** "Investigations of the Growth Kinetics of Nanocrystals and Nanorods by Employing SAXS and Other Techniques." **1st HOPE Meeting 24-28 Feb, 2008, JSPS, Tsukuba, Japan.**

3. **Talk: "**Growth Kinetics of ZnO Nanorods: Capping-dependent Mechanism and Other Interesting Features." **IUMRS-ICAM 2007, 10th International Conference on Advanced Materials, 8-13 Oct, 2007, Bangalore, India.**
4. **Poster:** "Growth Kinetics of Gold Nanocrystals: A Combined Small Angle X-ray Scattering and Calorimetric Study." **ICMS-ICMR Winter School on Chemistry and Physics of Materials, 6-13 Dec, 2007, Bangalore, India.**
5. **Poster:** "Metallic ReO_3 Nanocrystals: Synthesis, Properties and Surface-enhanced Raman Scattering of Aza-aromatics." **Advanced Workshop on Recent Developments in Nanomaterials, 15 - 19 Jan, 2007, Abdus Salam ICTP – Trieste, Italy.**
6. **Poster:** "Ferromagnetism in Mn-doped GaN nanocrystals prepared solvothermally at low temperatures." **ICMR-JNCASR Winter School on Chemistry and Physics of Materials, 12-19 Dec, 2006, Bangalore, India.**
7. **Poster:** "Synthesis and Characterization of Nanocrystals of the Oxide Metals, RuO_2, IrO_2 and ReO_3." **International Conference on Nano Science and Technology, 16-18 March, 2006, New Delhi, India.**

…… and attended many other conferences

REFERENCES

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