Curriculum Vitae

Ahin Roy
(Ph. D, Indian Institute of Science, 2015)

Date of Birth: April 15, 1988

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Experience

- **JSPS Postdoctoral fellow (Sep 2015 - present)**
  Department of Materials Science and Engineering, Kyushu University, Fukuoka, Japan
  Host professor: Prof. Kenji Kaneko

- **Graduate Student (October 2011 – Sep 2015)**
  Materials Research Centre, Indian Institute of Science, Bangalore-560012
  Thesis title: Investigations of Structural and Electronic Aspects of Ultrathin Metal Nanowires
  Advisors: Prof. N. Ravishankar and Prof. Abhishek Kumar Singh

Education

- **M.S. Chemical Science (August 2009-October 2011)** Division of Chemical Sciences, Indian Institute of Science, Bangalore, India. (part of Integrated Ph. D program)

- **B. Sc. Chemistry (June 2006-May 2009)** Ramakrishna Mission Residential College, Narendrapur, University of Calcutta, West Bengal, India.

Research Interest

Research interest broadly encompass:

- Wet-chemical fabrication of functional nanomaterials
- Investigation of structural and electronic aspects of inorganic nanomaterials through transmission electron microscopy and associated spectroscopic techniques
- Density functional theory (DFT) based atomistic modeling to explore electronic properties

Expected field of expertise

- *Ab initio* Density Functional Theory as implemented in VASP package - for electronic structure calculations of nanostructures
- Interpretation of electronic properties in the context of practical applications using an array of complementary tools.
- Electronic transport properties of nanoscale systems using Non-Equilibrium Green's Function (NEGF) approach – SIESTA and TranSIESTA codes
- Wet-chemical synthesis and structural characterization of low-dimensional structures
- Microstructural characterization of low-dimensional systems using electron microscopy

Experience with computational tools and instruments:

I have experience with first hand use of experimental characterization equipment along with various computational environments and packages. These include:

- Computation:

- Supercomputers: IBM Bluegene, Tyrone Cluster, DELL HPC cluster, Cray XC40
- Ab initio packages: VASP- 5.3 and SIESTA-3.2 (code installation, execution and data analysis through remote shell login)

- Experimental:

- X-ray powder Diffractometer (PANalytical)
- Scanning Electron Microscope (Carl Zeiss SEM)
- Transmission Electron Microscope (FEI Tecnai T20, FEI Tecnai F30, and JEOL ARM F200: TEM, and atomic resolution STEM characterization of nanomaterials)
- UV-VIS NIR Spectrometer
- Cyclic voltammetry
- Wet chemical synthesis of nanomaterials (Solvothermal and sol-gel synthesis)

Publication (ORCID id: 0000-0002-9515-2562)

1. K. Ghosh*, A. Roy*, S. Tripathi, S. Ghule, A. K. Singh and N. Ravishankar; Insights on Nucleation and Growth of Different Phases of WO_3: Morphology Control and Electrochromic Property (*equal contributions) Journal of Materials Chemistry C, 5, 7307-7316 (2017)

2. A. Pradhan, A. Roy, S. Tripathi, A. Som, D. Sarkar, J. K. Mishra, K. Roy, T. Pradeep, N, Ravishankar and A. Ghosh; Ultra-high Sensivity Infra-red Detection and Temperature Effects in Graphene-Tellurium Nanowire Binary Hybrid , Nanoscale, 9, 9284-9290 (2017)

3. A. Manjanath,* A. Roy,* A. Samanta and A. K. Singh; Negative Differential Resistance in Armchair Silicene Nanoribbons (*equal contributions), IOP Nanotechnology, 28, 275402 (2017)

4. T. Maeda, K. Kaneko, K. Yamada, A. Roy, Y. Sato, R. Teranishi, T. Kato, T. Izumi, and Y. Shiohara; Nanostructural characterization of artificial pinning centers in PLD-processed $REBa_2Cu_3O_{7-\delta}$ films; Ultramicroscopy, 176, 151-160 (2017)

5. A. Roy*, K. R. Amin*, S. Tripathi, S. Biswas, A. K. Singh, A. Bid, and N. Ravishankar; Manipulation of Optoelectronic Properties and Band Structure Engineering of Ultrathin Te Nanowires by Chemical Adsorption; (*equal contributions) ACS Applied Materials and Interfaces, 9, 19462-19469 (2017)

6. K. R. Amin, S. Kundu, S. Biswas, A. Roy, A. K. Singh, and N. Ravishankar; Effect of ambient on electrical transport properties of ultra-thin Au nanowires; Applied Physics Letters, 109, 253108 (2016)

7. A. Roy, S. Tripathi, Y. Sato, and K. Kaneko; Transmission Electron Microscopic Analysis of One-dimensional Metal Nanowire: The Case of Tellurium and Gold; Materia Japan, 55 (12), 603 (2016)

8. S. Tripathi, R. Bose, A. Roy, S. Nair, and N. Ravishankar; Synthesis of Hollow Nanotubes of Zn_2SiO_4 or SiO_2: Mechanistic Understanding and Uranium Adsorption Behavior; ACS Applied Materials and Interfaces, 7 (48), 26430–26436 (2015)

9. A. Roy, T. Pandey, N. Ravishankar, and A. K. Singh; Semiconductor-like Sensitivity in Metallic Ultrathin Gold Nanowire-based Sensors; Journal of Physical Chemistry C, 118, 676-682 (2014)

10. A. Roy, S. Kundu, K. Müller, A. Rosenauer, S. Singh, P. Pant, M. P. Gururajan, P. Kumar, J. Weissmüller, A. K. Singh, and N. Ravishankar; Wrinkling of Atomic Planes in Ultrathin Gold Nanowires; Nano Letters, 14, 4859-4866 (2014)

11. A. Roy, T. Pandey, N. Ravishankar, and A. K. Singh; Single Crystalline Ultrathin Gold Nanowires: Promising Nanoscale Interconnects; AIP Advances 3, 032131 (2013)

Invited Talks

1. Ahin Roy; Functional Low dimensional Materials: Insights from Atomistic Simulations and Designed Experiments; Department of Chemistry, IIT Guwahati, India, July-20, 2017 (Hosted by Prof. T. Punniyamurthy, HOD Chem, IIT-G, India)
2. Ahin Roy; Designed Experiments on Functional Low dimensional Materials from *ab initio* simulations; S. N. Bose National Centre for Basic Sciences, Kolkata, India, July-25, 2017 (Hosted by Prof. Priya Mahadevan at SNBNCBS, Kolkata)
3. Ahin Roy; Functional Low dimensional Materials: from ab initio Simulations and Experiments; CGCRI, Kolkata, India, July-26, 2017 (Hosted by Dr. Sandip Bysakh at CGCRI, Kolkata)
4. Ahin Roy; Functional Low dimensional Materials: Insights from Atomistic Simulations and Designed Experiments; Department of Metallurgical and Materials Engineering, IIT Madras, India, July-28, 2017 (Hosted by Prof. B. S. Murty, HOD, IIT-M, India)

Conference Presentations

Oral presentations:

1. Ahin Roy, Kazi Rafzani Amin, Shalini Tripathi, Sangram Biswas, Abhishek K. Singh, Aveek Bid, and N. Ravishankar; Adsorption Induced Band Structure Engineering of Te Nanowires; EMSI-2017, Delhi, India, 2016

2. Ahin Roy, Kazi Rafzani Amin, Shalini Tripathi, Sangram Biswas, Abhishek K. Singh, Aveek Bid, and N. Ravishankar; NO_2 Adsorption Induced Semiconductor to Metal Transition in Ultrathin Te Nanowires; ICTAM-AMF-10, Delhi, India, 2016

3. Ahin Roy, Kenji Kaneko, Knut Müller, Andreas Rosenauer, Abhishek K. Singh, and N. Ravishankar; Atomic Relaxation in Ultrathin FCC metal Nanowires; EMC- 2016, Lyon, France

4. Ahin Roy, Kenji Kaneko, Abhishek K. Singh and N. Ravishankar; Intriguing Atomic Structure and Semiconductor Nanowire Equivalent Sensitivity of Ultrathin Gold Nanowires; Microscopy Meeting, Kyushu University, Japan – 2015

5. Ahin Roy, Tribhuwan Pandey, N. Ravishankar and Abhishek K. Singh; Semiconductor-like Sensitivity Using Ultrathin Au Nanowire Sensors; Materials Research Society, Fall-2014, Boston, Massachusetts, USA

Posters:

1. Ahin Roy, Knad Ghosh, Shalini Tripathi, Siddharth Ghule, Abhishek Kumar Singh and N. Ravishankar; Phase and Morphology Control of Electrochromic WO_3; International Conference and Annual Meeting of Electron Microscope Society of India-2017; Mahabalipuram, Chennai, India

2. Ahin Roy, Knut Müller, Andreas Rosenauer, Abhishek Kumar Singh, and N Ravishankar;Surface Stress Induced Planar Wrinkling in Metal Nanowires; International Conference and Annual Meeting of Electron Microscope Society of India-2017; Mahabalipuram, Chennai, India (*selected as best poster)*

3. Ahin Roy, Yukio Sato, and Kenji Kaneko; Phosphorus Doping Induced Enhancement in Electrical Conductivity in Graphitic Carbon Nitride: Insights from *ab initio* Simulations; ICTAM-AMF-10, 2016, Delhi, India

4. Ahin Roy, R. Hinkoji, Kenji Kaneko, and Yukio Sato; First-principles Study of Antimony-doped Anatase Tin dioxide for Transparent Conducting Oxide Application; 36^{th} Electroceramics Society Meeting, Tokyo, Japan, 2016

5. Ahin Roy, Kenji Kaneko, Knut Müller, Andreas Rosenauer, Abhishek K. Singh, and N. Ravishankar; Atomic and Electronic Structures of Ultrathin Au Nanowires; AMTC-5, 2016, Nagoya, Japan

6. Ahin Roy, Abhishek K. Singh and N. Ravishankar ; Intriguing Relaxation Mechanism Driven by Anisotropic Surface Stress in Ultrathin Nanowires; Materials Research Society, Fall-2014, Boston, Massachusetts, USA

7. Ahin Roy, Shalini Tripathi and N. Ravishankar; Investigation of Structural and Electronic Properties of Ultrathin Te Nanowires; International Conference and Annual Meeting of Electron Microscope Society of India-2014; University of Delhi, Delhi, India

8. Ahin Roy, Akash R, Bratindranath Mukherjee and N. Ravishankar; Synthesis and Characterization of Intermetallic AuCu Nanowires; International Conference and Annual Meeting of Electron Microscope Society of India-2013; S. N. Bose National Centre for Basic Sciences, Kolkata, India

9. Ahin Roy, Tribhuwan Pandey, N. Ravishankar, and Abhishek K. Singh; Can Single Crystalline Au Nanowires be Promising Nanoscale Interconnects? ; Electronic Structure Approaches to Atoms, Molecules, Clusters and Solids-2013; University of Hyderabad, India

10. Ahin Roy, Tribhuwan Pandey, N. Ravishankar, and Abhishek K. Singh; Structural and Electronic Properties of Single Crystalline Gold Nanowires; HERMES Summer School – 2012, Imperial College of London

11. Paromita Kundu, Parag A. Deshpande, Ahin Roy, Giridhar Madras and N. Ravishankar; Nanoscale Heterostructures Based on ZnO with Enhanced Visible Light Harvesting Efficiency; Materials Research Society, Fall-2010, Boston, Massachusetts, USA

12. C. Nethravathi, B. Mukherjee, Ahin Roy and N. Ravishankar; Single Step Synthesis of Linker-free Quantum Dot-sensitized TiO_2 for Solar Cell Applications; Materials Research Society, Fall- 2010, Boston, Massachusetts, USA

Awards

1. Best Poster Prize Winner, International Conference and Annual Meeting of Electron Microscope Society of India; Mahabalipuram, Chennai, India (2017)
2. Young Scientist Award by Dr. K. V. Rao Scientific Society in Physics (2015)
3. JSPS Postdoctoral Fellowship (2015-2017)
4. Gold Award in Shell India Computational Talent Prize (SICTP) by Shell India (2014)
5. Unilever Science Communication Scholarship by HERMES committee, Imperial College, London – 2012
6. Integrated Ph. D fellowship at Indian Institute of Science (2009-2016)

Outreach Experience

"Microscopy at the Ultimate Limit: 'See'ing the Atoms in Materials" – Invited talk at Meizen High School, Kurume, Fukuoka, Japan on March 12, 2017 (JSPS Science Dialogue Program)

References

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