

# Ahin Roy

## Curriculum Vitae

CRANN, Trinity College Dublin  
Dublin-2, Ireland

+353-872170230

✉ royah@tcd.ie, ahinroy.iisc@gmail.com

📄 Research Webpage



### Experience

- Aug 2019 – **Research Fellow**, Advanced Microscopy Laboratory, Trinity College Dublin, Ireland.  
present Working on high-end electron microscopy of nanomaterials
- Nov 2017 – **Research Associate**, Indian Institute of Science, Bangalore, India.
- Jul 2019 Worked on computation, synthesis and electron microscopy of functional nanomaterials
- Sep 2015– **JSPS Postdoctoral Fellow**, Kyushu University, Fukuoka, Japan.
- Sep 2017 Worked on functional nanomaterials using aberration-corrected transmission electron microscopy
- Aug 2011– **Integrated Ph. D Research Fellow**, Materials Research Centre, Indian Institute of Science, Bangalore, India.
- Aug 2015 Worked on synthesis, characterization and simulations of metal nanowires

### Ph. D Thesis

- Title** Investigations of Structural and Electronic Aspects of Ultrathin Metal Nanowires
- Supervisors** Prof. N Ravishankar & Prof. Abhishek Kumar Singh

### Awards

- 2017 Best Poster Award, International Conference and Annual Meeting of Electron Microscope Society of India, Mahabalipuram, Chennai
- 2015 Young Scientist Award in Physics, Dr. K. V. Rao Scientific Society, Hyderabad
- 2015 JSPS Postdoctoral Fellowship, MEXT Japan (2015-2017)
- 2014 Gold Award, Shell India Computational Talent Prize
- 2012 Unilever-RSC Science Communication Scholarship, Imperial College, London
- 2009 Integrated Ph. D fellowship, Indian Institute of Science, Bangalore (2009-2016)
- 2002 Certificate of distinction, International Australian Mathematics Olympiad

### Education

- 2009–2011 **Masters of Science**, Indian Institute of Science, Bangalore.  
First Class

### Masters Thesis

- Title** Synthesis of ZnO-based Hybrid Nanostructures for Photovoltaic Applications
- Supervisors** Prof. N Ravishankar

2006–2009 **Bachelor of Science**, Ramakrishna Mission Residential College, Narendrapur, University of Calcutta.  
First Class Honours in Chemistry

## Skills and Expertise

- Electron Microscopy Have worked with FEI T20 and F30 TEMs for regular imaging, FEI TITAN Themis, JEOL-ARM, and **Nion** for atomic-scale and low-kV STEM. Proficient in regular maintenance (baking and conditioning) of JEOL-ARM.
- Simulation Density Functional Theory (DFT) based simulation of functional nanomaterials - VASP and SIESTA codes: expert in installation, execution and analysis
- Synthesis Wet-chemistry using hydrothermal and microwave methods, characterization using XRD, UV-vis spectroscopy, and electrochemistry using cyclic voltammetry

## Projects & Funding

- 2019–2021 Engineering photoluminescence of Tungsten Sulfide through Doping and Electrical Biasing; **Co-PI, DST-JSPS Bilateral Research Funding**
- 2015 Three-dimensional nanoanalyses of catalytic nanocomposite by electron tomography; **Fellow, JSPS Standard Postdoc Program**

## Publications

- [23] S. Ippolito, A. G. Kelly, R. F. de Oliveira, M. A. Stoeckel, D. Iglesias, **A. Roy**, C. Downing, Z. Bian, L. Lombardi, Y. A. Samad, V. Nicolosi, A. C. Ferrari, J. N. Coleman, P. Samori; Covalently interconnected transition metal dichalcogenides networks via defect engineering for high-performance electronic devices; **Nature Nanotechnology**, accepted (2020)
- [22] H. Kaur, R. Tian, **A. Roy**, M. McCrystall, D. Horváth, M. Ruether, A. Griffin, C. Backes, V. Nicolosi, J. Coleman; Production of quasi-2D platelets of non-layered iron pyrite (FeS<sub>2</sub>) by liquid-phase exfoliation and their use in high performance battery anodes; **ACS Nano**, 14, 13418-13432
- [21] G. Prakash, S. Kundu, **A. Roy**, A. K. Singh, N. Ravishankar and A. K. Sood; Carrier Dynamics in Ultrathin Gold Nanowires: Role of Auger Processes; **Plasmonics**, 15, 1151–1158 (2020)
- [20] T. Ahmed, P. Bellare, R. Debnath, **A. Roy**, N Ravishankar and A. Ghosh; Thermal history dependent current relaxation in hBN/MoS<sub>2</sub> van der Waals dimers; **ACS Nano**, 14, 5909-5916 (2020)
- [19] P. Kumar, K. Thakar, N. Verma, J. Biswas, T. Maeda, **A. Roy**, K. Kaneko, C. Nandi, S. Lodha, B. Viswanath; Polymorphic in-plane heterostructure of WS<sub>2</sub> for light-triggered FET device applications; **ACS Applied Nano Materials**, 3, 3750-3759 (2020)
- [18] L. Sharma, R. Gond, B. Senthilkumar, **A. Roy**, P. Barpanda; Fluorophosphates as Efficient Bifunctional Electrocatalysts for Metal-air Batteries; **ACS Catalysis**, 10, 43-50 (2020)

- [17] N. Jain, A. Roy; Phase & Morphology Engineered Surface Reducibility of MnO<sub>2</sub> Nano-heterostructures: Implications on Catalytic Activity towards CO Oxidation; *Materials Research Bulletin*, 121, 110615 (2020)
- [16] N. Jain, A. Roy, A. De; Ba-addition Induced Enhanced Surface Reducibility of SrTiO<sub>3</sub>: Implication on Catalytic Aspects; *Nanoscale Advances*, 1, 4938-4946 (2019)
- [15] N. Jain, A. Roy, S. Nair; Reduced SrTiO<sub>3</sub>-Supported PtCu Alloy Nanoparticles for Preferential Oxidation of CO in Excess Hydrogen; *Nanoscale*, 11, 22423-22431 (2019)
- [14] R. K. Rai, S. Islam, A. Roy, G. Agrawal, A. K. Singh, A. Ghosh and N. Ravishankar; Morphology Controlled Synthesis of Low Bandgap SnSe<sub>2</sub> with High Photodetectivity; *Nanoscale*, 11, 870-877 (2019)
- [13] P. Kumar, D. Chatterjee, T. Maeda, A. Roy, K. Kaneko and B. Viswanath; Scalable faceted voids with luminescence enhanced edges in WS<sub>2</sub> monolayers; *Nanoscale*, 10, 16321-16331 (2018)
- [12] S. Tripathi, A. Roy, S. Nair, S. Durani, and R. Bose; Removal of U(VI) from aqueous solution by adsorption onto synthesized silica and zinc silicate nanotubes: Equilibrium and kinetic aspects with application to real samples; *Environmental Nanotechnology, Monitoring & Management*, 10, 127-139 (2018)
- [11] K. Ghosh,<sup>‡</sup> A. Roy,<sup>‡</sup> S. Tripathi, S. Ghule, A. K. Singh and N. Ravishankar; Insights on Nucleation and Growth of Different Phases of WO<sub>3</sub>: Morphology Control and Electrochromic Property; *Journal of Materials Chemistry C*, 5, 7307-7316 (2017)
- [10] 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)
- [9] A. Manjanath,<sup>‡</sup> A. Roy,<sup>‡</sup> A. Samanta and A. K. Singh; Negative Differential Resistance in Armchair Silicene Nanoribbons; *IOP Nanotechnology*, 28, 275402 (2017)
- [8] 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<sub>2</sub>Cu<sub>3</sub>O<sub>7-δ</sub> films; *Ultramicroscopy*, 176, 151-160 (2017)
- [7] A. Roy,<sup>‡</sup> K. R. Amin,<sup>‡</sup> 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; *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 Ultrathin Au Nanowires; *Applied Physics Letters*, 109, 253108 (2016)

- [5] 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)
- [4] S. Tripathi, A. Roy, R. Bose, S. Nair, and N. Ravishankar; Synthesis of Hollow Nanotubes of  $\text{Zn}_2\text{SiO}_4$  or  $\text{SiO}_2$ : Mechanistic Understanding and Uranium Adsorption Behaviour; *ACS Applied Materials and Interfaces*, **7** (48), 26430–26436 (2015)
- [3] 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)
- [2] 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)
- [1] A. Roy, T. Pandey, N. Ravishankar, and A. K. Singh; Single Crystalline Ultrathin Gold Nanowires: Promising Nanoscale Interconnects; *AIP Advances* **3**, 032131 (2013)

‡ denotes equal contribution

## Conference Proceedings

- 2020 D. Samantaray, S. Shetty, S. Mondal, A. Roy, D. Chatterjee, P. Bellare, N Ravishankar; Mechanistic Studies of Growth of Ultrathin Pt and Alloy Nanowires; *Microscopy and Microanalysis* **26** (S2), 2400-2401
- 2020 R. K. Rai, S. Islam, A. Roy, G. Agrawal, A. Ghosh, N Ravishankar; Morphology Controlled Low-dimensional Single-crystalline  $\text{SnSe}_2$ -Graphene Hybrid for near IR Photodetection; *Microscopy and Microanalysis* **26** (S2), 2338-2340
- 2018 A. Pradhan, A. Roy, S. Tripathi, D. Sarkar, J. K. Mishra, K. Roy, T. Pradeep, N Ravishankar, A. Ghosh; Temperature Dependent Infra-red Detection in Graphene-Tellurium Nanowire Binary Hybrid with Ultra-high Sensitivity; *APS March Meeting 2018*, abstract id.T60.175
- 2017 S. Tripathi, K. Ghosh, A. Roy, A. K. Singh, N Ravishankar; Wet-chemical Synthesis of Electrochromic  $\text{WO}_3$  and  $\text{W}_x\text{Mo}_{1-x}\text{O}_3$  Nanomaterials with Phase and Morphology Control; *Microscopy and Microanalysis* **23** (S1), 1876-1877
- 2017 S. Tripathi, A. Roy, N Ravishankar; Ambient Dependent Formation of  $\text{Zn}_2\text{SiO}_4$  and  $\text{SiO}_2$  from Core-shell  $\text{ZnO}@\text{SiO}_2$ ; *Microscopy and Microanalysis* **23** (S1), 1758-1759
- 2017 S. Tripathi, K. Ghosh, A. Roy, A. K. Singh, N Ravishankar; Electrochromic tungsten molybdenum oxide: synthesis with phase and morphology control; *Acta Crystallographica A- Foundation and Advances* **73**, C1223
- 2016 A. Roy, K. Müller, K. Kaneko, A. Rosenauer, J. Weissmüller, A. K. Singh, N Ravishankar; Atomic relaxation in ultrathin FCC metal nanowires; *European Microscopy Congress 2016: Proceedings*, 423-424

## Outreach Experience

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

## Invited Talks

- Jun 2019 Combinatorial Interrogation of Functional Nanomaterials through Electron Microscopy and DFT Simulations; [EMAAT International Conference, Shimla, Himachal Pradesh, India](#)
- Oct 2018 Synergistic Atomistic Simulations and Designed Experiments for Functional Nanomaterials; [IIT Mandi, Himachal Pradesh, India](#).
- Aug 2018 Functional Materials Approaching Molecular Scale: Insights from Electron Microscopy, Simulations & Designed Experiments; [TIFR-TCIS Hyderabad, India](#)
- July 2017 Functional Low dimensional Materials: Insights from Atomistic Simulations and Designed Experiments; [Department of Metallurgical and Materials Engineering, IIT Madras, India](#)
- July 2017 Functional Low dimensional Materials from Atomistic Simulations and Targeted Experiments; [Department of Chemistry, IIT Guwahati, India](#)

## Contributed Talks

- 2020 Phase and Morphology Dependent Ion-intercalation in Electrochromic  $\text{WO}_3$ ; [Microscopy Society of Ireland Symposium, Trinity College Dublin, Ireland](#)
- 2018 3-D Atomic Structure of Ultrathin Metal Nanowires: the Cases of Au and Pt; [Annual Meeting of Electron Microscope Society of India, Bhubaneswar, India](#)
- 2017 Adsorption Induced Band Structure Engineering of Te Nanowires; [Annual Meeting of Electron Microscope Society of India, Mahabalipuram, India](#)
- 2016  $\text{NO}_2$  Adsorption Induced Semiconductor to Metal Transition in Ultrathin Te Nanowires; [ICTAM-AMF-10, Delhi, India](#)
- 2016 Atomic Relaxation in Ultrathin FCC metal Nanowires; [European Microscopy Congress, Lyon, France](#)
- 2015 Intriguing Atomic Structure and Semiconductor Nanowire Equivalent Sensitivity of Ultrathin Gold Nanowires; [Japan Society of Microscopy Regional Meeting, Kyushu University, Japan](#)
- 2014 Semiconductor-like Sensitivity Using Ultrathin Au Nanowire Sensors; [Materials Research Society, Fall- 2014, Boston, Massachusetts, USA](#)

## Professional Membership

- Life member [Electron Microscope Society of India \(EMSI\)](#)

## Languages

Bengali **Mothertongue**

English **Expert**

*Proficient in reading, writing and speaking*

Hindi **Intermediate**

*Conversationally fluent*

## References

[Prof. N Ravishankar](#)

Professor,

Materials Research Centre, Indian Institute of Science, Bangalore, India

Email: [nravi@iisc.ac.in](mailto:nravi@iisc.ac.in)

[Prof. Abhishek K. Singh](#)

Associate Professor,

Materials Research Centre, Indian Institute of Science, Bangalore, India

Email: [abhishek@iisc.ac.in](mailto:abhishek@iisc.ac.in)

[Prof. Kenji Kaneko](#)

Professor,

Department of Materials Science and Engineering, Kyushu University, Fukuoka, Japan

Email: [kaneko@zaiko.kyushu-u.ac.jp](mailto:kaneko@zaiko.kyushu-u.ac.jp)

[Prof. Valeria Nicolosi](#)

Professor,

School of Chemistry, Trinity College Dublin, University of Dublin, Ireland

Email: [nicolov@tcd.ie](mailto:nicolov@tcd.ie)

[Prof. Arindam Ghosh](#)

Professor,

Department of Physics, Indian Institute of Science, Bangalore, India

Email: [arindam@iisc.ac.in](mailto:arindam@iisc.ac.in)