Dr. BHARAT TANDON

McKetta Department of Chemical Engineering, The University of Texas at Austin, Austin, Texas 78712
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Education & Work Experience

UNIVERSITY OF TEXAS AT AUSTIN AUSTIN, USA
Postdoctoral Research Scholar June 2019-Present
Research Area: Dynamic Modulation of Plasmonic Response of Doped Metal Oxide Nanocrystals

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH PUNE, INDIA
Ph.D. (Doctorate of Philosophy) in Chemistry August 2015-April 2019
Thesis Title: Plasmonics and Magnetism from Doped Colloidal Indium Oxide Nanocrystals
Thesis Supervisor: Dr. Angshuman Nag

UNIVERSITY OF TEXAS AT AUSTIN AUSTIN, USA
Fulbright-Nehru Exchange Scholar August 2017-May 2018
Project: Study of Opto-Electronic Properties of Doped Metal Oxide Nanocrystals
Project Supervisor: Prof. Delia J. Milliron

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH PUNE, INDIA
Masters in Chemistry (CGPA 8.9/10) August 2013-May 2015

ST. STEPHEN'S COLLEGE, DELHI UNIVERSITY DELHI, INDIA
Bachelors in Chemistry (84% aggregate) August 2010-May 2013

Awards and Fellowships

- Infosys Foundation Travel Award by Infosys Foundation, India (**2019**)
- International Travel Support by Science and Engineering Research Board, India (**2019**)
- Forstering Science Financial Support by HERCULES European 2019 Synchrotron School (**2019**)
- Fulbright-Nehru Doctoral Research Fellowship by United States-India Education Forum (**2017**)
- Senior Research Fellowship by Council of Scientific and Industrial Research, India (**2017**)
- Junior Research Fellowship by Council of Scientific and Industrial Research, India (**2015**)
- Best Poster Award in Frontiers in Advanced Materials (**2015**)
- Masters Fellowship by Indian Institute of Science Education and Research, Pune (**2013**)
- Mohan Katyal Memorial Prize by St. Stephen's College for excellence in academics, co-curricular activities, moral character and selfless service (**2013**)

Research Experience

UNIVERSITY OF TEXAS AT AUSTIN AUSTIN, USA
Postdoctoral Research Scholar June 2019-Present

- Understanding surface depletion effects in doped metal oxide nanocrystals (NCs) through chemical doping
- Investigating the effect of dopant on surface depletion layer in doped metal oxide NCs

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH PUNE, INDIA
Doctoral Research Student August 2015-April 2019

- Successfully integrated LSPR and magnetism in doped metal oxide nanocrystals
- Achieved electron-mediated magnetic coupling in Mn-Sn codoped In_2O_3 NCs that led to 36% enhancement in magnetic moment and near ideal magnetic moment of 5 μ_B per Mn^{2+} ion
- Accomplished one of the highest LSPR figure of merit in plasmonics literature
- Mentored multiple undergraduate and postgraduate students on their thesis work

UNIVERSITY OF TEXAS AT AUSTIN AUSTIN, USA
Fulbright-Nehru Exchange Scholar August 2017-May 2018

- Established that for large sizes, optical coupling between NCs is the dominant driving force for LSPR modulation under an applied external potential
- Designed a dopant selection strategy for achieving high quality factors in doped metal oxide NCs

Publications

- **Tandon, B.†;** Gibbs, S. L.†; Zydlewski, B. Z.; Milliron, D. J. "Influence of Dopant on Surface Depletion and Extinction Coefficients in Doped Metal Oxide Nanocrystals" *Manuscript under preparation*
- **Tandon, B.†**; Shubert S. A.†; Milliron D. J.; "Modulating Plasmonics in Doped Metal Oxide Nanocrystals through Chemical Doping" *Manuscript under preparation*
- **Tandon, B.;** Lu, H. C; Milliron, D. J.; "Achieving Dual-Band Electrochromism: Plasmonics and Polaronics Approach" *Invited perspective under preparation*
- Gibbs, S. L.; Dean, C.; Saad, J.; **Tandon, B.**; Staller, C. M.; Agrawal, A.; Milliron D. J.; "Dual-Mode Infrared Absorption by Segregating Dopants within Plasmonic Semiconductor Nanocrystals" *Nano Lett.* **2020**, *20*, 7498
- **Tandon, B.**; Ghosh, S.; Milliron, D. J.; "Dopant Selection Strategy for High Quality Factor Localized Surface Plasmon Resonance from Metal Oxide Nanocrystals" *Chem. Mater.* **2019**, *31*, 7752
- **Tandon, B.**; Agrawal, A.; Heo, S.; Milliron D. J.; "Competition Between Depletion Effects and Coupling in the Plasmon Modulation of Metal Oxide Nanocrystals" *Nano Lett.* **2019,** *19*, 2012

- **Tandon, B.**; Yadav, A.; Khurana, D.; Reddy, P.; Santra, P. K.; Nag, A.; "Size-Induced Enhancement of Carrier Density, LSPR Quality Factor and, Carrier Mobility in Cr-Sn codoped In_2O_3 NCs, *Chem. Mater.* **2017**, *29*, 9360
- **Tandon, B.**; Yadav, A.; Nag, A.; "Delocalized Electrons Mediated Magnetic Coupling in Mn-Sn codoped In_2O_3 NCs" *Chem. Mater.* **2016**, *28*, 3620
- Shanker, G. S.†; **Tandon, B**†.; Shibata, T†.; Chattopadhyay, S.; Nag, A.; "Doping Controls Plasmonics, Electrical Conductivity, and Carrier-Mediated Magnetic Coupling in Fe and Sn Codoped In_2O_3 Nanocrystals: Local Structure Is the Key" *Chem. Mater.* **2015**, *27*, 892
- **Tandon, B**.; Shanker, G. S.; Nag, A.; "Multifunctional Sn- and Fe-Codoped In_2O_3 Colloidal Nanocrystals: Plasmonics and Magnetism" *J. Phys. Chem. Lett.* **2014,** *5*, 2306
- **Tandon, B.**; Ashok, A.; Nag, A.; "Colloidal Transparent Conducting Oxide Nanocrystals: A New Infrared Plasmonic Material" *Pramana-J. Phys.* **2015**, *84*, 1087
- Yadav, A.; **Tandon, B.***; Nag, A.*; "Reduction of Mn^{3+} to Mn^{2+} and Near Infrared Plasmonics from Mn–Sn codoped In_2O_3 Nanocrystals" *RSC Adv.* **2016**, *6*, 79153
  († = equal contribution)

Skills and Expertise

MATERIAL CHARACTERIATION
Electron Microscopy (SEM, TEM, STEM)
Spectroscopy (UV-Vis-NIR, FTIR, Raman, XAS)
Elemental Analysis (ICP-AES, EDX, XPS)
Dynamic Light Scattering
Powder X-Ray Diffraction
AC/DC Electronic Measurements
Electron paramagnetic resonance spectroscopy
Spectroscopic Ellipsometry
Spectroelectrochemistry

MATERIAL FABRICATION AND PROCESSING
Colloidal Nanocrystal Synthesis
Hot Injection and Slow Injection Synthesis
Ligand Exchange and Surface Modification
Doctor Blading and Spin Coating
RF Sputtering

SOFTWARES: Origin, EndNote, ImageJ, Diamond, MS-Office, MATLAB (beginner level)

LANGUAGES: English (TOEFL iBT Score 113/120), Hindi and Punjabi

References

- Prof. Delia J. Milliron, University of Texas at Austin, USA (milliron@che.utexas.edu)
- Dr. Angshuman Nag, IISER-Pune (angshuman@iiserpune.ac.in)
- Dr. Pramod Pillai, IISER-Pune (pramod.pillai@iiserpune.ac.in)

Conference Contributions (selected)

- **ACS Spring 2021** held virtually in April 2021
- **MRS Fall Meeting 2019** held in Boston, USA in December 2019

- **Hercules 2019 European School** held in Grenoble, France between March-April 2019
- **Frontiers in Advanced Materials** held at IISC, Bangalore in June 2015
- **International Conference on Nanoscience and Technology** held at IISER-Pune in March 2016
- **Mumbai-Pune Semiconductor Meet** held at IISER-Pune in March 2016.