

# Indu Venu Sabaraya

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## Education

Doctor of Philosophy, Civil Engineering	Expected: Aug 2020
The University of Texas at Austin	Current GPA: 3.74/4.00
Master of Science, Environmental and Water Resources Engineering	May 2016
The University of Texas at Austin	Overall GPA: 3.71/4.00
Bachelor of Engineering, Chemical Engineering	May 2014
Rashtreeya Vidyalaya College of Engineering (RVCE), Bangalore, India	Overall GPA: 9.12/10.00

## Highlights

- Strong background in synthesis and characterization of novel nanomaterials, assessment of their fate and transport in the environment, experience with applied and fundamental treatment processes
- Collaborative multidisciplinary research in Nanomaterial Science, Infrastructure Materials Engineering, Biophysics, Chemical Engineering
- Mentorship and teaching experience in varied learning environments

## Leadership Experience

- *Outreach organizer and volunteer*, EPA-funded outreach project with Girl Scout troops **Jan 2018-Aug 2019**
- *Logistics Committee Member*, GAIN 2019, Graduate and Industry Networking (GAIN) event **Aug 2018**
- *Member*, EWRE Seminar Committee, Weekly seminar organizer **Fall 2016, Spring 2017**
- *Research Mentor for five undergraduate students* **Fall 2016-Spring 2019**
  - 'Effect of geometry on gold nanoparticle fate and transport': Mentee awarded Undergraduate Research Fellowship in 2017
  - 'Effectiveness of Pickering emulsions of nanohybrids in organic dye degradation': Mentee awarded Undergraduate Research Fellowship in 2016, 1st place PEER GLUE Division and 3rd place PEER Underclassmen Division
- *Senior Member*, Sponsorship Committee, RVCE, Managed partnerships for annual fest **Spring 2014**

## Research Experience

**Graduate Research Assistant** **Aug 2015-Present**

**Advisors:** Dr. Navid Saleh and Dr. Mary Jo Kirisits, UT Austin, Austin, TX

- *2-Dimensional Nanomaterial Interactions in Complex Aquatic Environments*
  - o Investigated structure-property relationships of chemically exfoliated 2-D nanomaterials (MoS<sub>2</sub>) in relation to environmental transport in the presence of natural geocolloids and natural organic matter
  - o Preparing to investigate degradation of model flexible electronic device containing single-layer MoS<sub>2</sub> in simulated leachate background and impact of degradation products on landfill-relevant mixed microbial community
- *Design of Novel Nanohybrids, Fate and Transport Assessments of novel nanomaterials:*
  - o Designed a simple, novel method for metal oxide and carbon nanotubes conjugate nanoparticles
  - o Assessed UV-mediated chemical transformation of the synthesized nanohybrids with materials characterization such as HRTEM, SEM, XPS, AFM, TGA/DSC, SLS/DLS, ICP-OES, UV-vis spectroscopy

- *Investigation of Nano-Bio Material Interactions towards Inhibiting Biofilm Growth:*
  - o Measured changes in viscoelastic moduli when *Pseudomonas aeruginosa* biofilms interact with carbon nanotubes;
  - o Quantified aggregation of *P.aeruginosa* cells in the presence of MWNTs using flow cytometry and optical contrast imaging
- *Effect of Nanomaterial Dispersion on Low-Temperature Property Enhancement of Asphalt:*
  - o Investigated dispersion characteristics of typical nano-materials in solvents representing a physico-chemical environment of asphalt binders
  - o Studied statistical correlation between performance characteristics of asphalt binders and retention of nanoscale identity in surrogate solvents

**Research Assistant, RVCE, Bangalore, India**

**Spring 2014, Spring 2013**

- *Green synthesis of ZnO nanoparticles using Calotropis gigantea:* Designed green synthesis route for facile, large-scale production of ZnO
- *Photocatalytic Degradation of Textile Dyes in Effluent Streams:* Investigated dye degradation efficiency of green-synthesized ZnO nanoparticles

## Teaching Experience

**Instructor, General Engineering, UT Austin**

**Fall 2017, Spring 2015**

- Designed lectures; Taught supplementary Physics and Chemistry for freshman engineers in the role of an instructor

**Teaching Assistant, Civil Engineering, UT Austin,**

**Spring 2017, Spring 2016, Fall 2014**

- Introduction to Environmental Engineering, Nanotechnology Laboratory, and Introduction to Computer Methods

## Publications

- Merryman, A. E., Sabaraya, I. V., Rowles III, L. S., Toteja, A., Carrillo, S. I., Sabo-Attwood, T., & Saleh, N. B. (2019). Interaction between functionalized multiwalled carbon nanotubes and MS2 bacteriophages in water. *Science of The Total Environment*, 670, 1140-1145.
- Saleh, N.; Khalid, A.; Tian, Y.; Ayres, C.; Sabaraya, I.; Pietari, J.; Hanigan, D.; Chowdhury, I.; Apul, O. (2018). Removal of poly- and per-fluoroalkyl substances from aqueous systems by nano-enabled water treatment technologies. *Environmental Science: Water Research & Technology*, 5(2), 198-208.
- Sabaraya, I. V., Filonzi, A., Hajj, R., Das, D., Saleh, N. B., & Bhasin, A. (2018). Ability of Nanomaterials to Effectively Disperse in Asphalt Binders for Use as a Modifier. *Journal of Materials in Civil Engineering*, 30(8), 04018166.
- Isaac, K. M., Sabaraya, I. V., Ghouseifam, N., Das, D., Pekkanen, A., Romanovicz, D. K., Long, T.E., & Rylander, M. N. (2018). Functionalization of single-walled carbon nanohorns for simultaneous fluorescence imaging and cisplatin delivery. *Carbon*, 138, 309-318.
- Das, D., Sabaraya, I.V., Sabo-Attwood, T., Navid, S. (2018). Insights into Metal Oxide and Zero-Valent Metal Nanocrystal Formation on Multiwalled Carbon Nanotube Surfaces during Sol-Gel Process. *Nanomaterials*, 8(6).
- Das, D., Sabaraya, I. V., Zhu, T., Sabo-Attwood, T., & Saleh, N. B. (2018). Aggregation Behavior of Multiwalled Carbon Nanotube-Titanium Dioxide Nanohybrids: Probing the Part-Whole Question. *Environmental Science & Technology*, 52(15), 8233-8241.
- Das, D., Plazas-Tuttle, J., Sabaraya, I. V., Jain, S. S., Sabo-Attwood, T., & Saleh, N. B. (2017). An elegant method for large scale synthesis of metal oxide-carbon nanotube nanohybrids for nano-environmental application and implication studies. *Environmental Science: Nano*, 4(1), 60-68.

- Plazas-Tuttle, J., Das, D., Sabaraya, I. V., & Saleh, N. B. (2018). Harnessing the power of microwaves for inactivating *Pseudomonas aeruginosa* with nanohybrids. *Environmental Science: Nano*, 5(1), 72-82.
- Aich, N., Boateng, L. K., Sabaraya, I. V., Das, D., Flora, J. R., & Saleh, N. B. (2016). Aggregation kinetics of higher-order fullerene clusters in aquatic systems. *Environmental Science & Technology*, 50(7), 3562-3571.

## Conference and Poster Presentations

- Sabaraya, I. V., Saleh, N. B., Kirisits, M. J., Incorvia, J. A. C., \*Rowles III, L. S., \*Ayres, C. "The role of pH on Heteroaggregation of 2-D MoS<sub>2</sub> and Kaolinite". 7th Sustainable Nanotechnology Organization Conference, November 08-10, 2018, Washington, DC.
- \*Filonzi, A., \*Hajj, R., Sabaraya, I. V., Das, D., Saleh, N. B., Bhasin, A., "Investigating the Ability of Nanomaterials to Effectively Disperse in Asphalt Binders for Use as a Modifier". Transportation Research Board Annual Research Meeting, January 07-11, 2018, Washington, DC.
- \*Sabaraya, I., Dipesh D., Saleh, N. "Chemical Identity of the Metal Oxides on Carbon-Metal Heterostructures Control Photo-transformation of These Nanohybrids". 5<sup>th</sup> Sustainable Nanotechnology Organization Conference, November 10-12, 2018, Orlando, FL.
- Das, D., Sabaraya, I., Aich, N., & \* Saleh, N. "Aggregation kinetics of carbon nanotube and metal or metal oxide nanohybrids in aquatic environment". 250th American Chemical Society National Meeting, August 16-20, 2015, Boston, MA.
- \*Sabaraya, I., Dipesh D., Saleh, N. "Photo-transformation of titanium dioxide-and zinc oxide-multiwalled carbon nanotube heterostructures in aqueous environment.". 252nd American Chemical Society National Meeting, August 21-25 2016, Philadelphia, PA.

\*Presented work at conference

## Honors and Awards

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| - <i>Certification</i> , Student Employee Excellence Development (SEED) Program, UT Austin | <b>Dec 2018</b>  |
| - <i>Recipient</i> , TAWWA 2018 Scholarship  | <b>Dec 2018</b>  |
| - <i>Recipient</i> , Environmental Research and Education Foundation Scholarship           | <b>Sept 2018</b> |
| - <i>Recipient</i> , Professional Development Award: Travel award                          | <b>Sept 2016</b> |
| - <i>Recipient</i> , Cockrell School of Engineering Fellowship                             | <b>Sept 2016</b> |

## Analytical Characterization Technique Expertise

Transmission Electron Microscopy	X-Ray Photoelectron Spectroscopy
Scanning Electron Microscopy	Energy Dispersive Spectroscopy
Cryo-Transmission Electron Microscopy	Thermo-gravimetric Analysis
Atomic Force Microscopy	UV/Visible spectroscopy
Raman Spectroscopy	Static and Dynamic Light Scattering
Fourier Transform Infrared Spectroscopy	Inductively-Coupled Plasma – Optical Emission Spectroscopy

## Skills

- Computer programming languages: MATLAB, R, SAS, Python
- Basic proficiency in ArcGIS Pro, ASPEN HYSYS, Star CCM+, Adobe Illustrator
- Fluent in English, Hindi, Malayalam