

# Nikhil R. Agrawal - Curriculum Vitae

Process Engineer 3  
Deposition Product Group, Lam Research  
Building C, 11355 SW Leveton Drive  
Tualatin, OR, USA 97062

+1 6504416519  
✉ [nikhilagrwal0165@gmail.com](mailto:nikhilagrwal0165@gmail.com)  
[in linkedin.com/in/nikhilagrwal0165](https://www.linkedin.com/in/nikhilagrwal0165)  
[github/nikhil0165](https://github.com/nikhil0165), Google Scholar: [shorturl.at/yB158](https://scholar.google.com/citations?user=shorturl.at/yB158)

## EDUCATION

---

**Ph.D. in Chemical Engineering** August 2018 - August 2024  
**University of California, Berkeley, USA**  
Advisor: Prof. Rui Wang  
Thesis title: *Modified Gaussian Renormalized Fluctuation Theory for Electrolytes at Interfaces*  
Thesis committee: David T. Limmer, Kranthi K. Mandadapu, and Clayton J. Radke

**B.S. and M.S. (Dual Degree) in Chemical Engineering** July 2013 - July 2018  
**Indian Institute of Technology (IIT), Delhi, India**  
Master's thesis title: *Minkowski Tensors to Characterize Particle Packings in Packed Bed Reactors*  
Master's thesis advisor: Prof. Shantanu Roy  
*Institute medal for highest GPA in the program*

## RESEARCH EXPERIENCE

---

**Plasma Enhanced Atomic Layer Deposition (PEALD) processes** Oct '24 - Present  
Process Engineer 3 | Deposition Product Group  
Lam Research, Tualatin, Oregon, USA

**Thermodynamics and transport modeling of electrolytes at interfaces** Aug '18 - Present  
Ph.D. Candidate | Mentor: Prof. Rui Wang  
Pitzer Center for Theoretical Chemistry, UC Berkeley, California, USA

**Deep Gaussian Processes for uncertainty quantification of machine-learned free energies** Mar '24 - June '24  
Research Intern | Mentor: Dr. Amit Samanta  
Physics & Materials Science Division, Lawrence Livermore National Laboratory, California, USA

**Hybrid Kinetic Monte-Carlo and MD simulations to study mitotic spindle formation** June '23 - Aug '23  
Summer Predoctoral Researcher | Mentor: Dr. Adam R. Lamson and Prof. Michael J. Shelley  
Center for Computational Biology, Flatiron Institute, New York, USA

**Microscopic characterization of particle packings in packed bed reactors** Jan '17 - July '18  
Master's Candidate | Mentor: Prof. Shantanu Roy  
Department of Chemical Engineering, IIT Delhi, India

**Sequential Particle Deposition to simulate overdamped granular systems** May '17 - July '17  
Visiting Researcher | Mentor: Prof. Dr. Thorsten Pöschel  
Institute of Multi-scale Simulations (MSS), University of Erlangen-Nuremberg, Germany

**Image processing and pore network modeling for multiphase flows in porous media** May '16 - July '16  
Summer Research Associate | Mentor: Dr. Paul Duru  
Institut de Mecanique des Fluides de Toulouse (IMFT), Toulouse, France

**Design and characterization of visible light photo-catalysts for CO<sub>2</sub> reduction** May'15 - April '16  
Undergraduate Researcher | Mentor: Prof. Suddhasatwa Basu  
Department of Chemical Engineering, IIT Delhi, India

## JOURNAL PUBLICATIONS AND PREPRINTS

---

1. Understanding long-range opposite-charge repulsion in multivalent salt solutions  
**Nikhil R. Agrawal**, Carlo Carraro and Rui Wang, *under review*, [arXiv:2408.15520](#).
2. Electrostatic Correlation Augmented Self-Consistent Field Theory and Its Application to Polyelectrolyte Brushes  
Chao Duan, **Nikhil R. Agrawal**, and Rui Wang, *under review*, [arXiv:2404.09103](#).
3. Nature of overcharging and charge inversion in electrical double layers  
**Nikhil R. Agrawal**, Chao Duan, and Rui Wang, *The Journal of Physical Chemistry B*, 2024, 128, 1, 303–311
4. Ion correlation-driven like-charge attraction in multivalent salt solutions  
**Nikhil R. Agrawal**, Ravtej Kaur, Carlo Carraro and Rui Wang, *The Journal of Chemical Physics* 159, 244905 (2023)
5. Non-monotonic salt concentration dependence of inverted electrokinetic flow  
**Nikhil R. Agrawal** and Rui Wang, *AIChE Journal*, e18269, 2023.
6. Self-consistent description of vapor-liquid interface in ionic fluids  
**Nikhil R. Agrawal** and Rui Wang, *Physical Review Letters* (2022), 129, 228001.
7. Electrostatic correlation induced ion condensation and charge inversion in multivalent electrolytes  
**Nikhil R. Agrawal** and Rui Wang, *Journal of Chemical Theory and Computation* (2022), 18, 6271-6280
8. A first-order segregation phenomenon in fluid-immersed granular systems  
Prapanch Nair, LAT Cisneros, CRK Windows-Yule, **Nikhil R. Agrawal**, Shantanu Roy, and Thorsten Pöschel, *Powder Technology* 373 (2020): 357-361.
9. Isotropy of sphere packings in a cylindrical confinement  
**Nikhil R. Agrawal**, Prapanch Nair, Thorsten Pöschel and Shantanu Roy, *Chemical Engineering Journal* 377 (2019): 119820.  
  
In preparation:
10. Sturm–Liouville theory inspired method to solve the Modified Gaussian Renormalized Fluctuation theory for electrolytes  
**Nikhil R. Agrawal**, Carlo Carraro and Rui Wang.

## COURSEWORK AND CERTIFICATIONS

---

- |   |   |
|---|---|
| • Bayesian Data Analysis and Machine Learning for Physical Sciences                           | • Fundamentals of Deep Learning (NVIDIA)  |
| • Machine Learning, Statistical Models, and Optimization for Biological and Chemical Problems | • Data Parallelism: How to Train Deep Learning Models on Multiple GPUs (NVIDIA) |
| • Statistical Thermodynamics & Transport Phenomena  | • Model Parallelism: Building and Deploying Large Neural Networks (NVIDIA)      |
| • Finite Element Methods  | • Chemical Reaction Engineering I and II  |
| • Numerical Methods in Chemical Engineering   | • Fundamentals of Computational Fluid Dynamics                                  |

## SELECTED PRESENTATIONS

---

1. Beyond mean-field Poisson-Boltzmann: A self-consistent theory for electrical double layers  
*2023 American Physical Society March Meeting*, Poster Presentation
2. A self-consistent theory for complex electrostatic phenomena at interfaces  
*2022 American Chemical Society Colloid and Surface Science Symposium*, Oral Presentation
3. Ion correlation induced non-monotonic height change and microphase separation of polyelectrolyte brushes  
*2024 American Physical Society March Meeting*, Oral Presentation
4. Electrostatic wetting transition: charge inversion and like charge attraction  
*2021 American Chemical Society Colloid and Surface Science Symposium*, Oral Presentation
5. Correlation Induced Electrostatic Wetting and Charge Inversion  
*2020 American Institute of Chemical Engineers Annual Meeting*, Oral Presentation

## AWARDS AND HONOURS

---

- Langmuir Graduate Student Oral Presentation Awards Finalist, American Chemical Society 2022
- *Institute Silver Medal* from IIT Delhi for highest GPA in the dual degree program in Chemical Engg. 2018
- IIT Delhi *Semester Merit Award* for 9 out of 10 semesters for being among *top 7%* meritorious students across the dual degree program, *consecutively for 8 semesters* 2013-2017
- *Significant Contribution to Research Activities Award* by Chemical Engineering Society, IIT Delhi 2017
- *Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship* by Department of Science and Technology, Govt. of India 2013
- Was among the *Nation's Top 1%* merit holders in National Standard Examination in Physics (NSEP) conducted by the Indian Association of Physics Teachers (IAPT) 2013

## ACADEMIC ADVISING

---

- Julien Kehon, Undergraduate majoring in Chemical Engg. at UC Berkeley (Jan 2022 - May 2022)
- Ravtej Kaur, Undergraduate majoring in Chemical Engg. at UC Berkeley (Jan 2023 - August 2023)

## SERVICE & OUTREACH

---

### Secretary, SPIC MACAY, IIT Delhi

April '15 - April '16

SPIC MACAY: *Society for Promotion of Indian Classical Music And Culture Amongst Youth*

Led a team of 13 to organize marketing, publicity, and hospitality of club events like dance workshops and music concerts for eminent artists including Grammy Awardee Pt. Vishwa Mohan Bhatt.

## SKILLS

---

<b>Domain Knowledge</b>	Computational Modeling, Thermodynamics, Transport Phenomena, Applied Machine Learning, Finite Difference, Finite Element, and Spectral Methods
<b>Programming Skills</b>	Python, C++, PyTorch, GPyTorch, TensorFlow, Scikit Learn, Bash
<b>Technical software</b>	ParaView, MATLAB, COMSOL, FLUENT, Autodesk Inventor
<b>Languages</b>	English and Hindi

## HOBBIES AND INTERESTS

---

Sociology, Psychology, listening to classical music, and a keen interest in philosophical discussions