

# NAGASREE GARAPATI, Ph.D., P.E.

201 Birds Eye View  
Morgantown, WV 26501

[nagasree.garapati@mail.wvu.edu](mailto:nagasree.garapati@mail.wvu.edu)  
(304) 276-3674

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## Education

- **Doctor of Philosophy** in Chemical Engineering  
Minor in Applied Fluid Dynamics  
West Virginia University, Morgantown, WV (GPA: 4.0/4.0) 2010-2013
- **Master of Science** in Chemical Engineering  
West Virginia University, Morgantown, WV (GPA: 4.0/4.0) 2007-2009
- **Bachelor of Technology** in Chemical Engineering  
Osmania University, Hyderabad, AP, India (First in Class of 60) 2003-2007

## Certification

**Professional Engineer, Chemical Engineering, State of West Virginia - 23670**

## Employment

- Visiting Assistant Professor** – West Virginia University, Morgantown, WV 2020- Present  
Department of Chemical and Biomedical Engineering
- Research Assistant Professor** – West Virginia University, Morgantown, WV 2016-2020  
Department of Chemical and Biomedical Engineering
- Research Associate** – University of Minnesota, Minneapolis, MN 2015-2016  
Advisor: Dr. Martin O. Saar, Department of Earth Sciences.
- Academic Guest** – Swiss Federal Institute of Technology in Zurich (ETH-Z) 2015-2016  
Advisor: Dr. Martin O. Saar, Department of Earth Sciences.
- Postdoctoral Associate** – University of Minnesota, Minneapolis, MN 2013-2015  
Advisor: Dr. Martin O. Saar, Department of Earth Sciences.
- Graduate Research Assistant** – West Virginia University, Morgantown, WV 2007-2013  
Advisor: Dr. Brian J Anderson, Department of Chemical Engineering.

## Teaching Experience

### Instructor

- West Virginia University, Morgantown, WV 2016-Present
  - ChE 202 – Material and Energy Balances 2
  - ChE 201 – Material and Energy Balances 1
  - ChE 351 – Chemical Process Laboratory
  - ChE 451 – Unit Operations Laboratory
  - ChE 475 – Chemical Process Safety
  - ChE 531 – Mathematical Methods in Chemical Engineering

### Mentor

- West Virginia University, Morgantown, WV 2016-Present
  - Advised Graduate (1) students
  - Advising Undergraduate Students (5; Honor EXCEL: 1, SURE:1, RAP:1; Work Study:4)
- Swiss Federal Institute of Technology in Zurich (ETH-Z) March-August 2016
  - Co-advised graduate student in his MS project.
- University of Minnesota, Minneapolis, MN Summer 2013
  - Guided an undergraduate summer intern in her project.
- West Virginia University, Morgantown, WV 2012-2013
  - Guided new graduate students in lab in their research

### Guest Lecture

- West Virginia University, Morgantown, WV 2009-2013
  - ChE 320 – Chemical Engineering Thermodynamics.

### Honors & Awards

- **Recipient of 2020 Inaugural Award in Excellence in Diversity, Equity and Inclusion**, Statler College of Engineering and Mineral Resources, WVU. **2020**
- **Nominated** for Faculty Award for Distinction in Mentoring of Undergraduates in Research **2020 & 2019**
- **Padmashri B.V.Raju Best Merit Student Award** in Chemical Engineering by Indian Institute of Chemical Engineers (IChE), Hyderabad Chapter. **2006**
- **Gold Medal** for best student in academics, Little Flower Junior College, India. **2003**

### Teaching Workshop

- Virtual Workshop, 2021 ABET Symposium (Spring 2021).
- ACUE's micro-credential course in Designing Student-Centered Courses (Spring 2021).
- ACUE's micro-credential course in Creating an Inclusive and Supportive Online Learning Environment (Fall 2020).
- Virtual Workshop, National Effective Teaching Institute - Online (Summer 2020)
- Workshop, Summer Remote Teaching Institute & Hybrid Teaching Institute, Teaching and Learning Commons, WVU (Summer 2020)
- ASEE Chemical Engineering Summer School, North Carolina State University, Raleigh, NC (Summer 2017)
- Effective teaching practices based on the ACUE framework, West Virginia University, Morgantown, WV (Spring 2017)

### Research Grants

#### Current Support

1. Title: Analysis of Geothermal Deep Direct-Use Combined with Reservoir Thermal Energy Storage on the West Virginia University Campus-Morgantown, WV (PI; 4 Years; Selected)  
Sponsor: DOE-EERE- Geothermal Technologies Office;  
Total Award: \$9,054,390; Individual Share: \$862,535
2. Title: Applications of Petroleum Data Analytics Using Proprietary Data Sets from Permian Operator (PI; 08/01/2020–03/31/2022)  
Sponsor: National Energy Technology Laboratory; Leidos  
Total Award: \$75,000; Individual Share: \$75,000
3. Title: Estimation of greenhouse gas emissions from gas hydrates in Alaska North slope (PI; 1 Year; Selected)  
Sponsor: National Energy Technology Laboratory; Leidos;  
Total Award: \$60,000; Individual Share: \$60,000
4. Title: Feasibility of Deep Direct Use Geothermal on the West Virginia University Campus-Morgantown, WV (PI; 10/01/2017–04/01/2020; Completed)  
Sponsor: DOE EERE-Geothermal Technologies Program;  
Total Award: \$843,517; Individual Share: \$454,081

#### Pending Support

5. Title: Engineered Metal and Metal Oxides Microparticle Technologies to Enhance Conductivity and Heat Transference in Enhanced Geothermal Systems (PI; 3 Years; Submitted)  
Sponsor: DOE-EERE- Geothermal Technologies Office;  
Total Award: \$3,245,000; Individual Share: \$296,266

### **Professional Society Memberships**

Geothermal Resources Council (GRC)	2018-Present
American Society for Engineering Education (ASEE)	2016-Present
American Geophysical Union (AGU)	2013-Present
American Chemical Society (ACS)	2012-Present
American Institute of Chemical Engineers (AIChE).	2009-Present

### **Professional Service**

Guest Editor, J. Energy and Power Technology, CO <sub>2</sub> Utilization	2021-Present
Session chair at AIChE Annual Fall meeting	2019-Present
Session chair at 44 <sup>th</sup> Stanford Geothermal Workshop	2019-Present
Session chair at Geothermal Resources Council Annual Meeting & Expo	October 2018
Geothermal Ambassador, International Geothermal Association	2019-Present
Reviewer ACS-Petroleum Research Fund Proposal	2019-Present
Reviewer Applied Energy, Geothermal Energy, Energies	2018-Present
Panelist, NSF Graduate Research Fellowship Program	2017-Present
Reviewer Journal of Chemical and Engineering Data	2016-Present
Reviewer Journal of Natural Gas Science and Engineering	2015-Present
University of Minnesota Postdoctoral Association (UMN-PDA, Treasurer)	2013-2015

### **Departmental Service**

Department Diversity, Equity, & Inclusion Committee (Chair)	2021-Present
Undergraduate Academic Affairs (Committee Member)	2020-Present
ABET Assessment (Committee Member)	2020-Present
Substitute Instructor (ChE 201)	2017, 2019
Judging Undergraduate poster abstract competition (AIChE)	2016

### **Outreach Activities**

Diversity Within: Intersectionality among Women of Color, WVU	March 2021
<ul style="list-style-type: none"><li>Participated in a panel discussion exploring women of color's unique experiences within our community and seek to foster unity and support among women of color across different identities.</li></ul>	
Westwood Middle school, 8 <sup>th</sup> graders (25 students)	November 2018
<ul style="list-style-type: none"><li>Presented material about geothermal energy and explained prospects of STEM career, specifically in Chemical engineering.</li></ul>	

### **Invited Talks**

- Guest lecture on Low temperature Geothermal Energy Systems, International Seminar on Textile, Pharma, Food, and Chemical Technologies (TPFC), University College of Technology, Osmania University, Hyderabad, India, January 28, 2021.
- Guest lecture on Geothermal energy and Gas hydrates for China Energy Investment Group Class of 2018, Morgantown, WV, November 28, 2018.
- Panelist on Productive Uses of CO<sub>2</sub>/Low-Carbon Transportation Fuels: TransTech Energy Business Development Conference, Morgantown, WV, October 26-27, 2016.

## Publications

**Peer Reviewed Papers (Total: 15; h index: 9; Garapati 1<sup>st</sup> author: 5 and co-author: 10)**

**Since joining WVU (i.e., 2016; total: 10)**

- Myshakin, E., **Garapati, N.**, Seol, Y., Gai, X., Collett, T., Boswell, R., Ohtsuki, S., Sato, M., Kumagai, K., Suzuki, K., Okinaka, N. “*Numerical Simulations of Depressurization-Induced Gas Hydrate Reservoir (Unit B) Response at the Prudhoe Bay Unit Kuparuk 7-11-12 Pad on Alaska North Slope*”, special research volume, Energy and Fuels (2021; In Preparation)
- Chapman, J. S., **Garapati, N.**, Glezakou, V.-A., Duan, Y., Hu, J., Dinu, C.Z. “*Hydrophilic MIL-160-based membrane exhibits pressure-dependent selective uptake of industrially relevant greenhouse gases*”, RSC, Materials Advances (2021; Accepted).
- Adams, B. M., Vogler, D., Kuehn, T.H., Bielicki, J.M., **Garapati, N.**, Saar, M.O. “*Heat depletion in sedimentary basins and its effect on the design and electric power output of CO<sub>2</sub> plume geothermal (CPG) systems*”, Renewable Energy, 172 (2021): 1393-1403.
- **Garapati, N.**, Adams, B., Fleming, M., Kuehn, T., Saar, M.O. “*Combining Brine or CO<sub>2</sub> Geothermal Preheating with Low-temperature Waste Heat: A Higher-efficiency Hybrid Geothermal Power System*”, J. CO<sub>2</sub> Util., 42 (2020): 101323.
- Zhang, Y., **Garapati, N.**, Doughty, C., Pierre, J., “*Modeling Study of Deep Direct Use Geothermal on the West Virginia University Campus-Morgantown, WV*”, Geothermics, 87 (2020): 101848.
- McCleery, R. S., McDowell, R.R., Moore, J. P., **Garapati, N.**, Carr, T.R., Anderson, B.J., “*Development of 3-D geological model of Tuscarora Sandstone for Feasibility of Deep Direct-Use Geothermal at West Virginia University’s Main Campus*”, GRC Transactions, 42 (2018): 192-208.
- Qian, L., Chapman, J., Aisheng, H., Kenneth, C. W., Wagner, A., **Garapati, N.**, Konstantinos, S., Dinu, C.Z., “*User-tailored Metal-Organic Frameworks as Supports for Carbonic Anhydrase*”, ACS Applied Materials & Interfaces 10 (2018): 41326-41337.
- Sridhara, P., Anderson, B.J., **Garapati, N.**, Seol, Y., Myshakin, E.M., “*Novel Technological Approach to Enhance Methane Recovery from Class 2 Hydrate Deposits by Employing CO<sub>2</sub> Injection*”, Energy and Fuels, 32 (2018): 2949-2961.
- **Garapati, N.**, Adams, B. M., Bielicki, J.M., Schaedle, P., Randolph, J., Kuehn, T.H., Saar, M.O., “*A hybrid geothermal energy conversion technology –A potential solution for shallow geothermal resources*”, Energy Procedia, 114 (2017): 7060-7070.
- Walsh, S.D.C., **Garapati, N.**, Leal, A.M.M., & Saar, M.O., “*Calculating Thermophysical Fluid Properties during Geothermal Energy and Geofluids Production with NESS and Reaktor*”, Geothermics, 70 (2017):146-154.

**Prior joining WVU (total: 5)**

- **Garapati, N.**, Randolph, J., Saar, M.O., “*Brine displacement by CO<sub>2</sub>, heat energy extraction rates, and lifespan of an axi-symmetric CO<sub>2</sub> Plume Geothermal system with a horizontal production well*”, Geothermics, 55 (2015): 182-194.
- Saar, M.O., Buscheck, A. T., Jenny, P., **Garapati, N.**, Randolph, J., Bielicki, M.J., “*Numerical Study of Combined Multi-Fluid and Multi-level Geothermal System Performance*” in Proceedings of World Geothermal Congress , April 2015.
- **Garapati, N.**, Randolph, J., Saar, M.O., “*CO<sub>2</sub>-Plume based Geothermal (CPG) Heat Extraction in Multi-Layered Geologic Reservoirs*”, Energy Procedia, 63 (2014): 7631-7643.
- Luhmann, A.J., Kong, X-Z., Tutolo, B.M., **Garapati, N.**, Bagley, B.C., Saar, M.O., Seyfried, W.E.Jr., “*Experimental dissolution of dolostone by CO<sub>2</sub>- charged brine at 100 °C and 150 bars: Evolution of porosity, permeability, and reactive surface area.*”, Chemical Geology, 380 (2014): 145-160.

- **Garapati, N.,** Anderson, B.J., “*Statistical Thermodynamics Model and Empirical Correlations for Predicting Mixed Hydrate Phase Equilibria*”, Fluid Phase Equilibria, 373 (2014): 20-28.

**Conference Proceedings (Total: 13; Garapati 1<sup>st</sup> author: 11 and co-author: 2)**

**Since joining WVU (i.e., 2016; total: 5)**

- **Garapati, N.,** Collett, T.S., Zyrianova, M.V., “*Economic and Life Cycle Assessment of Gas Production from Gas Hydrate Prospects on Alaska North Slope*”, 10<sup>th</sup> International Conference on Gas Hydrates (ICGH10), Singapore, July 2023.
- Adams, B. M., Fleming, M. R., Bielicki, J.M., **Garapati, N.,** Saar, M.O. “*An Analysis of the Demonstration of a CO<sub>2</sub>-based Thermosiphon at the SECARB Cranfield Site*”, 46<sup>th</sup> Workshop on Geothermal Reservoir Engineering, Stanford, CA, February 2021.
- **Garapati, N.,** Irr, V. J., Lamb, B., “*Feasibility Analysis of Deep Direct-Use Geothermal on the West Virginia University Campus-Morgantown, WV*”, 45<sup>th</sup> Workshop on Geothermal Reservoir Engineering, Stanford, CA, February 2020.
- **Garapati, N.,** Alonge, O.B., Hall, L. Y., Irr, V. J., Zhang, Y., Smith, J.D., Pierre, J., Doughty, C., “*Feasibility of Development of Geothermal Deep Direct-Use District Heating and Cooling system at West Virginia University Campus-Morgantown, WV*” in Proceedings of 44<sup>th</sup> Workshop on Geothermal Reservoir Engineering, Stanford, CA, February 2019.
- **Garapati, N.,** Zhang, Y., Pierre, J., Doughty, C., Anderson, B.J., “*Subsurface modeling and well configuration design for geothermal deep direct-use district heating system at West Virginia University Campus-Morgantown, WV*” TOUGH Symposium, Berkeley, CA, October 2018.

**Prior joining WVU (total: 8)**

- **Garapati, N.,** Randolph, J., Finsterle, S., Saar, M.O., “*Simulating Reinjection of Produced Fluids into the Reservoir*” in Proceedings of 41<sup>st</sup> Workshop on Geothermal Reservoir Engineering, Stanford Geothermal workshop, Stanford, CA, February 2016.
- **Garapati, N.,** Randolph, J., Saar, M.O., “*Design of CO<sub>2</sub>-Plume Geothermal (CPG) subsurface system for various geologic parameters*” Proceedings of the Fifth International Conference on Coupled Thermo-Hydro-Mechanical-Chemical (THMC) Processes in Geosystems: Petroleum and Geothermal Reservoir Geomechanics and Energy Resource Extraction, Salt Lake City, UT, 2015.
- **Garapati, N.,** Randolph, J., Saar, M.O., “*Superheating Low-Temperature Geothermal Resources to Boost Electricity Production*” Proceedings of the Fortieth Workshop on Geothermal Reservoir Engineering, Stanford Geothermal workshop, Stanford, CA, 2015.
- **Garapati, N.,** Randolph, J., Saar, M.O., “*Total Heat Energy Output from, Thermal Energy Contributions to, and Reservoir Development of Conventional, Hydrofractured, and CO<sub>2</sub> Plume Geothermal (CPG) Systems*” in Proceedings of the Thirty-Ninth Workshop on Geothermal Reservoir Engineering, Stanford Geothermal workshop, Stanford, CA , February 2014.
- **Garapati, N.,** McGuire, P.C., Anderson, B.J., “*Modeling the Injection of Carbon Dioxide and Nitrogen into a Methane Hydrate Reservoir and the Subsequent Production of Methane Gas on the North Slope of Alaska.*” Unconventional Resources Technology Conference. Denver, CO, August 2013.
- Anderson, B., **Garapati, N.,** McGuire, P. “*Reservoir Modelling and Numerical Analysis of the Ignik Sikumi Gas Hydrate Field Trial*” in 75<sup>th</sup> EAGE Conference & Exhibition-Workshops, London, UK, June 2013.
- **Garapati, N.,** Anderson, B.J., “*Implementation of cell potential code into HydrateResSim simulator*”, CO<sub>2</sub> Capture, Sequestration, Conversion and Utilization, FUEL: Division of Fuel Chemistry, 243<sup>rd</sup> ACS National Meeting, San Diego, CA, March 2012.

- **Garapati, N.**, Velaga, S., Anderson, B.J., “*Development of a Thermodynamic Framework for the simulation of Mixed Gas Hydrates: Formation, Dissociation and CO<sub>2</sub>-CH<sub>4</sub> Exchange*”, Proceedings of the 7<sup>th</sup> International Conference on Gas Hydrates, Edinburgh, Scotland, United Kingdom, July 2011.

### Paper Presentations

#### Since joining WVU (i.e., 2016; total: 10)

- Chapman, J. S., **Garapati, N.**, Glezakou, V.-A., Duan, Y., Hu, J., Dinu, C.Z., “*Molecular dynamics simulations probe greenhouse gas sorption capabilities of metal organic framework-based membrane for efficient gas separation processes*”, AIChE Annual Meeting, Boston, MA, 2021.
- **Garapati, N.**, Alonge, O.B., Irr, V. J., Lamb, B., “*Development of Deep Direct-Use Geothermal system on West Virginia University Campus-Morgantown, WV*”, AIChE Annual Meeting, Orlando, FL, 2019.
- Chapman, J., **Garapati, N.**, Dinu, C.Z., “*Computational Analysis of MOF-Enzyme Interactions for Next Generation of Sensitive Biosensors*”, AIChE Annual Meeting, Orlando, FL, 2019.
- Qian, L., Aisheng, H., Chapman, J., Kenneth, C. W., **Garapati, N.**, Dinu, C.Z., “*Metal Organic Frameworks Promise High Activity and Stability of Carbonic Anhydrase in Synthetic Environment*” in AIChE Annual meeting, Pittsburgh, PA, USA, 2018.
- **Garapati, N.**, Alonge, O.B., Lemasters, D., Vozniak, S., Saurborn, L., Anderson, B.J., “*Development of integrated geothermal district heating and cooling (GDHC) system at West Virginia University Campus-Morgantown, WV*” in AIChE Annual meeting, Pittsburgh, PA, USA, 2018.
- **Garapati, N.**, Anderson, B.J., Carr, T.R., “*Feasibility of Deep Direct Use Geothermal on the WVU Campus- Morgantown, WV*” in 2018 SMU Power Plays conference, Dallas, TX, USA, 2018.
- **Garapati, N.**, Anderson, B.J., “*Feasibility of Deep Direct Use Geothermal on the WVU Campus-Morgantown, WV*” in Geothermal Technologies Office 2017 Peer Review, Denver, CO, USA, 2017.
- **Garapati, N.**, Adams, B. M., Bielicki, J.M., Randolph, J., Kuehn, T. H., Saar, M.O., “*Hybrid geothermal energy conversion-a potential solution for low-temperature geothermal resources*” in AIChE Annual meeting, Minneapolis, MN, USA, 2017.
- **Garapati, N.**, “*First impressions are the most lasting: Setting the tone for the course on the first day of the class*” in American Society for Engineering Education Summer School for Chemical Engineering Faculty, NCSU, Raleigh, NC, 2017.
- **Garapati, N.**, Walsh, S. D. C., Leal, A. M. M., Schaedle, P., Saar, M.O., “*Effect of Geothermal Fluid Composition on Power Production*” in AGU Fall Meeting, San Francisco, CA, 2016.

#### Prior joining WVU (total: 13)

- Saar, M.O., **Garapati, N.**, Adams, B. M., Randolph, J., Kuehn, T. H., “*A hybrid geothermal energy conversion technology: Auxiliary heating of geothermally preheated water or CO<sub>2</sub> – a potential solution for low-temperature resources*” in EGU General Assembly, Vienna, Austria 2016
- **Garapati, N.**, Adams, B. M., Randolph, J., Kuehn, T. H., Saar, M.O., “*Auxiliary heating of geothermally preheated water or CO<sub>2</sub> – a potential solution for low- to moderate-temperature geothermal resources*” in AGU Fall Meeting, San Francisco, CA, 2015.
- **Garapati, N.**, Adams, B. M., Saar, M.O., Randolph, J., Kuehn, T. H. (2015) *Optimizing Geothermal System Performance Through Iterative Coupling of Reservoir and Surface Plant Simulations*, First Workshop of Numerical Geothermal Simulation, Munich.
- **Garapati, N.**, Randolph, J., Saar, M.O., “*Effect of Reservoir-Caprock Interface Dip and Circulation of Produced Fluid on CO<sub>2</sub>-Based Geothermal Heat Extraction from Saline Aquifers*” in AGU Fall Meeting, San Francisco, CA, 2014.

- **Garapati, N.**, Randolph, J., Saar, M.O., “*CO<sub>2</sub>-Plume Based Geothermal (CPG) Heat Extraction in Multi-layered Geologic Reservoirs*” in AIChE Annual meeting, Atlanta, GA, USA, 2014.
- **Garapati, N.**, Randolph, J., Saar, M.O., “*Analysis of Geologic Parameters on the Performance of CO<sub>2</sub>-Plume Geothermal (CPG) Systems in a Multi-Layered Reservoirs*” in AGU Fall Meeting, San Francisco, CA, 2013. (Poster)
- **Garapati, N.**, McGuire, P.C., Anderson, B.J., “*Reservoir Modeling of Production of CH<sub>4</sub> from Natural Gas Hydrates by Injection of a CO<sub>2</sub>+N<sub>2</sub> Gas Mixture*” in AAPG Annual Convention & Exhibition, Pittsburgh, PA, USA, 2013. (Poster)
- **Garapati, N.**, McGuire, P.C., Liu, Y., Anderson, B.J., “*Modeling the Injection of Carbon Dioxide and Nitrogen into a Methane Hydrate Reservoir and the Subsequent Production of Methane Gas on the North Slope of Alaska*” in AGU Fall Meeting, San Francisco, CA, 2012.
- **Garapati, N.**, Anderson, B.J., “*Injection of Carbon Dioxide and Nitrogen in to Methane Hydrate Reservoirs: Binary HydrateResSim Simulations*” in AIChE Annual meeting, Pittsburgh, PA, USA, 2012.
- Garapati, N., Velaga, S., Anderson, B.J., “*Gas Hydrates Modeling: Spanning Multiple Scales*” in AIChE Annual meeting, Pittsburgh, PA, USA, 2012. (Poster)
- Garapati, N., Anderson, B.J., “*Phase Equilibrium Predictions of Mixed Hydrates by Cell Potential Code: Validation using Experimental Data and Implementing into Reservoir Simulators*” in AIChE Annual meeting, Salt lake city, UT, USA, 2010.
- **Garapati, N.**, Anderson, B.J., “*Predictions of Phase Equilibrium Data of Mixed Hydrates Using the Cell Potential Method,*” in West Virginia Academy of Science 85<sup>th</sup> Annual Meeting, Morgantown, WV, USA, 2010. (Poster)
- **Garapati, N.**, Anderson, B.J., “*Predictions of Mixed Hydrate Phase Equilibria and the Swapping of CH<sub>4</sub> Hydrate with CO<sub>2</sub> and CO<sub>2</sub>+N<sub>2</sub> Mixtures*” in AIChE Annual meeting, Nashville, TN, USA, 2009.