Ioannis (Yanni) Karampelas



Assistant Professor
Department of Mechanical and Aerospace Engineering
Edward E. Whitacre Jr. College of Engineering
Texas Tech University

Expertise

- **Computational Fluid Dynamics (CFD), Heat/Mass Transfer and Multiphase Transport Phenomena**
- **Microfluidics and Phoretic Transport Phenomena**
- **AI-Accelerated Simulation and Surrogate Modeling for Multiphysics Systems**
- **Metal Casting and Advanced Manufacturing Process Simulation**
- **Biological and Nanoscale Systems Modeling (photothermal energy conversion, bioapplications of nanotechnology)**
- **Machine Learning-Driven Design of Separation and Modular Reactor Systems**
- **Computational Modeling for Circular Nitrogen Economy and Sustainable Fertilizer Production**

Qualifications

2011 – 2016 **PhD in Chemical and Biological Engineering**
Department of Chemical and Biological Engineering, University at Buffalo, Buffalo, NY
Dissertation: *Numerical Analysis of Pulsed-Laser Plasmon-enhanced Photothermal Energy Conversion and Nanobubble Generation in the Nanoscale*
Advised by: Professor Edward P. Furlani

2002 – 2008 **Diploma of Chemical Engineering** (equivalent to BSc and MSc)
Department of Chemical Engineering, National Technical University of Athens, Greece
Thesis: *Design and Development of a Multiscale Microchannel Heatsink for High-Performance Electronics Cooling: A Computational Analysis*
Advised by: Professor Nikolaos H. Markatos

Professional Experience

2026 –Present **Assistant Professor**
Department of Mechanical and Aerospace Engineering
Edward E. Whitacre Jr. College of Engineering
Texas Tech University

2019 – 2026 **Senior Casting Simulation Engineer**
NEMAK, SA Wisconsin Product Development Center
Metal casting simulation engineer. Coordinator of the North American (NA) simulation group. Responsible for training new members in the use of computational software packages.
Notable recent achievements:

1. **HPDC Casting simulation**. Since 2019, I have performed metal casting simulations on a variety of casting designs for High Pressure Die Casting (HPDC) ranging from housings to automotive structural components. This work is regularly presented in a variety of company and customer meetings and has been applauded by both customers and colleagues. Successfully developed more than 10 projects leading to improved first-time-through (FTT) quality metrics. For existing programs, my simulation

recommendations resulted in production part scrap% improvements thus improving profitability. Overall, my work resulted in a profitability recapture of $500,000.

2. **Simulation group coordinator**. Organized and performed a series of weekly meetings to improve communication and performance of the NA simulation group (~10 members). The goal of the meetings is to provide a podium for every team member to express ways of improving current processes and exchange ideas related to metal casting simulation. Such meetings also offer the opportunity to coordinate work between team members and determine project deadlines.
3. **Educator and mentor of new engineers**. Directly trained and mentored new team members in the use of metal casting-specific computational modeling software. Created a series of educational videos to serve as reference training material. New members were able to work independently after only 4 weeks of training.

2016 – 2019 **CFD Engineer**

Flow Science, Inc. Department of support and services.

Customer success and sales consultant. CFD model Developer. Supervisor of product documentation and user training. Salesforce administrator. Company connection to Academia.

Notable achievements:

1. **Sales**. Actively participated in conversations with prospective customers resulting in 12 major successful sales and a multitude of other sale opportunities resulting in company revenue of $250,000.
2. **Customer Support**. Successfully resolved more than 350 support cases per year. Customers include major automotive, metal casting, consumer products and water and environmental companies, and research groups from national universities. Customer retention and maintenance revenue of $60,000.
3. **Consulting and Services**. Successfully negotiated major consulting projects for metal casting applications (more than 8 casting parts) for a total revenue of $20,000.
4. **Marketing**. Helped expand the FLOW-3D website simulation gallery with metal casting and microfluidics simulations (https://www.flow3d.com/simulation-video-gallery/). Participated and presented in AIChE Annual Meeting (2018) and TechConnect World Conference (2018). Provided feedback on the design of the latest website and authored blog and hints/tips articles.
5. **Product development - QA testing**. Provided constructive feedback after thorough beta testing. Reported a multitude of issues (improvements/bugs/product development ideas).
6. **Product development - Particle dissolution model**. Developed a novel gas and mass particle dissolution model to be used in the modeling of all types of dissolving powder/bubbles. The model was recently used in the simulation of aerators, dissolving protein powder and was added to the official product.
7. **CRM system implementation**. Implementing and administrating a customer relations management (CRM) system based on Salesforce. Performed market research on CRM systems, determined optimum system for implementation, created workflows and guides for optimum efficiency, customized and applied the CRM environment to suit the needs of the company.
8. **Academic outreach - Magnetohydrodynamic (MHD) model**. In collaboration with researchers at University at Buffalo, developed a novel MHD analytical model that was used in the simulation of stirring of molten metal and the modeling of MHD droplet ejection for drop-on-demand metal 3D printing.

2011 – 2016 **Research Assistant**

Department of Chemical and Biological Engineering, University at Buffalo, Buffalo, NY.

CFD Researcher. Computational laboratory manager. Mentor of M.S students.

Notable Projects:

1. **VADER Systems**. Modeling of a novel drop-on-demand molten metal 3D printing system. Performed a series of CFD simulations designed to explore the details of droplet ejection, flight, impact and subsequent solidification in the formation of 3D objects.
2. **S.Howes**. Demonstrated proof-of-principle of using CFD computational models to predict thermal conveyor performance. Programmed additional semi-numerical models that

quickly calculate the exit temperature of the product given the geometrical characteristics of the conveyor and the product properties.

3. **Cabot Corp**. Implemented a multi-scale CFD, lumped-element and an analytical modeling approach to predict the fundamental behavior and performance of a Knudsen-pumped solar thermal energy harvesting system.
4. **IMA Life Corp**. Used computational modeling to determine viable operating parameters of a high-throughput continuous-drop freeze drying system for producing monodisperse spherical freeze-dried pharmaceutical products.

Academic Experience

Research

2019 – 2026 **Senior Casting Simulation Engineer**
NEMAK, SA Wisconsin Product Development Group
Notable projects:

1. **Discrete modeling of Jet-Cooled core pin**. Performed microscale simulations to determine the effective heat transfer of a high-pressure cooling pin (Jet Cooled) by discretely modeling the cooling effected by phase change at the tip and compared with experimental results.
2. **Mechanical properties prediction modeling**. Applied the output of numerical model for the prediction of the microscale dendritic structure evolution during solidification to a material physical properties prediction model. The model effectively translates the microscale structure of material into predicted material properties such as Ultimate Tensile Strength. The numerical model developed appears to provide initial results that are in good agreement with experimental trials. This project is still ongoing.

2016 – 2019 **CFD Engineer**
Flow Science, Inc.
Notable projects:

1. **Accoustophoretic particle model**. Adapted a deforming object model to be used in the generation of soundwaves that were used to focus micro- and nano-sized particles in microchannels.
2. **Magnetophoretic particle separation**. Applied Furlani's analytical model for magnetic particle migration from blood to a buffer solution in a continuous flow microseparator. In collaboration with University of Cantabria, Spain, developed and applied the necessary physical models for removing magnetically labeled toxins from septic patients' blood. This study involved both simulations and experiments. The numerical models developed are in good agreement with the experimental results.
3. **Capillary flows in open microchannels.** In collaboration with University of Washington, provided the numerical simulations in a study of shear, flow velocities and leading interface speed for open microchannels.
4. **Droplet ejection and generation in capillary channels.** In collaboration with University of New Mexico, developed a series of models for acoustic droplet creation and collection in capillary channels.
5. **Ferrofluid droplet generation and deflection across multilaminar flow streams.** In collaboration with University of Cantabria, Spain, and University of Hull, UK, developed a numerical 2-step approach for studying ferrofluid droplet generation (passive and active generation) as well as droplet deflection by magnetic fields across multilaminar flow reaction chambers. The simulated results are in good agreement with the experimental evidence.

2011 – 2016 **Research Assistant**
Department of Chemical and Biological Engineering, University at Buffalo, Buffalo, NY
Notable Projects:

1. **PhD Dissertation**: *Photothermal Energy Conversion and Nanobubble Generation*. Used a combination of computational photonics and CFD to study fundamental light-matter interactions at the nanoscale. This includes the development of multi-scale models to

predict the optical response of nanostructures, photothermal transduction at plasmon resonance, heat transfer to the surrounding fluid and the dynamics of nanobubble generation under conditions of superheating, with an ultimate goal of designing a novel method for cancer treatment.

2. **Academic Grant**: *Effects of microgravity on the human visual system* (Univ. of Texas Medical Branch). Developed numerical CFD-FSI biomechanical models of the human eye to enable detailed predictions of pressure-induced stress and deformation in ocular tissues.

Education and Teaching

2022 – 2026 **Capstone Project Judge**
As an industry expert in simulations, I serve as a judge for the capstone projects of senior engineering students at Texas Tech University for the course of Chemical Process Design and Simulation (CHE 4455).

2019 - 2026 **Computational Metal Casting Education**
Prepared, delivered and recorded a series of lectures with the purpose of educating new engineers in the use of computational tools used in metal casting. The training material included examples and student exercises. It is currently being used as mandatory basic training material for new members. Leader and manager of the bi-weekly Engineering Education and Innovation meeting for simulation engineers located in NA.

2018 **Metal Casting Training**
Prepared and delivered training materials for the FLOW-3D CAST metal casting training class. Educated new and senior engineers in simulation setup and result analysis for metal casting simulations of HPDC, LPDC, Tilt pour and gravity casting processes. Rated 9.5/10.

2017 **Advanced Numerical Training**
Invited to deliver an advanced training class on the use of numerical settings for computational software at the international FLOW-3D users conference in Barcelona, Spain. This class aims to educate experienced engineers in the selection of the appropriate mathematical and numerical methods depending on application.

2016 – 2018 **Introduction to CFD**
Prepared and delivered training materials for the FLOW-3D introductory training class. This class consists of lectures and exercises aiming to educate new engineers in the use of FLOW-3D. It is taught locally in the Flow Science, Inc. headquarters in Santa Fe, NM every 3 months and consists of more than 20h of lectures and training exercises. Consistently rated more than 9.2/10.

2014 **Optofluidics Guest Lecturer**
Prepared and gave a series of lectures introducing young engineers to the use of FLOW-3D and COMSOL as computational modeling tools for a variety of class projects.

2013 **Teaching Assistant (Optofluidics)**
A 4th year undergraduate and 5th year graduate student optional course with more than 30 undergraduate and graduate students. Sole responsibility for preparing and grading assignments and exams, held recitation sessions and additional exam review sessions.

2012 **Teaching Assistant (Separation Process Engineering)**
A 3-credits core course with 50+ undergraduate students. Graded assignments, exercises and exams, held recitation sessions and scheduled course seminars.

2012 **Teaching Assistant (Applied Mathematics for Chemical Engineers)**
A 3-credit hour core course with 90+ undergraduate students. Prepared and graded homework and exams, gave tutorials and lectures, held office hours and additional exam review sessions, mentored undergraduate students in the use of computational tools.

Publications

Google scholar summary (as of 09/26/26): 770 citations; 41 documents; h-index: 16

Articles

2012 Furlani, E.P., **Karampelas, I.H.**, Xie, Q., Analysis of pulsed laser plasmon-assisted photothermal heating and bubble generation at the nanoscale. Lab on a Chip 12 (2012) 3707-3719.

2013 Alali, F., **Karampelas, I.H.**, Kim, Y.H., Furlani, E.P., Photonic and Thermofluidic Analysis of Colloidal Plasmonic Nanorings and Nanotori for Pulsed-Laser Photothermal Applications. Journal of Physical Chemistry C 117 (2013) 20178-20185.

2015 Berthier, J., Brakke, K. A., Furlani, E. P., **Karampelas, I. H.**, Poher, V., Gosselin, D., Cubizolles, M., Pouteau, P., Whole blood spontaneous capillary flow in narrow V-groove microchannels. Sensors and Actuators B-Chemical 206 (2015) 258-267.

2016 **Karampelas, I.H.**, Liu, K., Alali, F., Furlani, E.P., Plasmonic Nanoframes for Photothermal Energy Conversion. Journal of Physical Chemistry C 120 (2016) 7256-7264.

2017 Gómez-Pastora, J., Xue, X., **Karampelas, I.H.**, Bringas, E., Furlani, E.P., Ortiz, I. Analysis of magnetic separators for magnetic beads recovery: From large systems to multifunctional microdevices. Separation and Purification Technology 172 (2017) 16-31.

2017 Gómez-Pastora, J., **Karampelas, I.H.**, Xue, X., Bringas, E., Furlani, E.P., Ortiz, I. Magnetic Bead Separation from Flowing Blood in a Two-Phase Continuous-Flow Magnetophoretic Microdevice: Theoretical Analysis through CFD Simulation. Journal of Physical Chemistry C 121 (2017) 7466-7477.

2017 Gómez-Pastora, J., **Karampelas, I.**, Bringas, E., Furlani, E. P., & Ortiz, I. Computational Analysis of a Two-Phase Continuous-Flow Magnetophoretic Microsystem for Particle Separation from Biological Fluids. Computer Aided Chemical Engineering 40 (2017) 1183-1188.

2019 Gómez-Pastora, J., Amiri, V., **Karampelas, I.H.**, Al-Orabi, A.Q., Tarn, M.D., Iles, A., Paunov, V.N., Bringas, E., Pamme, N., Furlani, E.P., Ortiz. I. Two-Step Numerical Approach To Predict Ferrofluid Droplet Generation and Manipulation inside Multilaminar Flow Chambers. Journal of Physical Chemistry C 123 (2019) 10065-10080.

2019 Gómez-Pastora, J., **Karampelas**, **I.H.,** Bringas, E., Furlani, E.P., Ortiz, I.. Numerical analysis of bead magnetophoresis from flowing blood in a continuous-flow microchannel: Implications to the bead-fluid interactions. Scientific Reports 9 (2019) 7265.

2020 Roodan, V.A., Gómez-Pastora, J., **Karampelas**, **I.H.,** González-Fernández, C., Bringas, E., Ortiz, I, Chalmers, J.J., Furlani, E.P., Swihart, M.T. Formation and manipulation of ferrofluid droplets with magnetic fields in a microdevice: A numerical parametric study. Soft Matter 16 (2020) 9506-9518.

2022 **Karampelas**, **I.H.,** Gómez-Pastora, J.Novel approaches on the numerical modeling of particle and cell separations in microfluidics. Processes 10(6) (2022) 1226.

2024 Rezaei, B., Harun, A., Wu, X., Iyer, P., Mostufa, S., Ciannella, S., **Karampelas**, **I.H.,** Chalmers, J.J., Srivastava, I., Gómez-Pastora, J., Wu, K. Effect of Polymer and Cell Membrane Coatings on Theranostic Applications of Nanoparticles: A Review. Advanced Healthcare Materials 13 (2024) 2401213.

2024 Rezaei, B., Moni, H.E.J., **Karampelas**, **I.H.,** Sharma, A., Mostufa, S., Azizi, E., Liu, X., Zeng, M., Gómez-Pastora, J., He, R., Wu, K. Additive Manufacturing of Magnetic Materials for Energy, Environment, Healthcare, and Industry Applications. Advanced Functional Materials *35*(10) (2024) 2416823.

2025 Moni, H.E.J., Rezaei, B., **Karampelas**, **I. H.,** Saeidi-Javash, M., Gómez-Pastora, J., Wu, K., Zeng, M. Printing rare-earth-free (REF) magnetic inks: synthesis, formulation, and device applications. Nanoscale 17 (2025) 4830-4853.

2025 Iyer, P.R., Wu, X., Choe, H., Tran, L.N.T., Paz Gonzalez, K.M., Rezaei, B., Mostufa, S., Azizi, E., **Karampelas**, **I.H**, Wu, K., Chalmers, J.J., Gomez-Pastora, J. Magnetic-Assisted Manipulation of Rare Blood Cells for Diagnosis: A Systematic Review. Biotechnology & Bioengineering 122(10) (2025) 2625-2665

2025 Abarca, J.A., Wu, X., González-Fernández, C., **Karampelas**, **I.H.,** Gutierrez-Carballo, A., Gauthier, J.A., Botte, G.G., Solla-Gullon, J., Irabien, A., Diaz-Sainz, G., Gomez-Pastora, J. Magnetically enhanced electrochemical conversion of CO_2 to formate: Experimental studies. Chemical Engineering Journal 515 (2025) 163614.

2025 Wu, X., Choe, H., Ciannella, S., Paz Gonzalez, K.M., Tran, L.N.T., Iyer, P.R., Yunker, B.A., **Karampelas**, **I.H.,** Wu, K., Zborowski, M., Wyslouzil, B., Chalmers, J.J., Gomez-Pastora, J. Investigation of Magnetic Nanoparticle Recovery using a Quadrupole Magnetic Field via Numerical Simulation and SAXS. Separation and Purification Technology 372 (2025) 133504.

2026 Hart, J., Tran, L.N.T., Faranaz Ena, T., Natekar, N.A., Rezaei, B., Jiao, Y., Zuo, H., Wang, H., Chugh, V, Azizi, E., **Karampelas**, **I.H.,** He, R., Gomez-Pastora, J., Wu, K. Magnetic Nanoparticles for Cancer Theranostics. Biomedical Physics and Engineering Express. 12 (2026) 022001

2026 Mostufa, S., Rezaei, B., Shahriar, M. T., Paz González, K. M., Xu, C., Suk Eo, Y., **Karampelas**, **I. H.,** Gómez-Pastora, J., He, R., Wu, K. Scalable Wet Ball Milling of Iron Oxide Nanoparticles for Efficient and Controllable Magnetic Hyperthermia. ACS Applied Nano Materials. 11, no. 12 (2026): e70960

Conference Papers

2012 Furlani E.P., **Karampelas I.H.**, Xie Q., *Pulsed-laser plasmon-assisted nanoscale photothermal energy transfer in fluid*. (2012) Laser Science, LS 2012.

2013 **Karampelas I.H.**, Furlani E.P., Nunez A., Vizzeri G., *Multiscale biomechanical modeling of the human eye*. (2013) Technical Proceedings of the 2013 NSTI Nanotechnology Conference and Expo, NSTI-Nanotech 2013, 2, pp. 354 – 357.

2013 Alali F., **Karampelas I.H.**, Kim Y.H., Furlani E.P., *Analysis of pulsed-laser plasmon-enhanced photothermal energy transfer with applications*. (2013) Technical Proceedings of the 2013 NSTI Nanotechnology Conference and Expo, NSTI-Nanotech 2013, 2, pp. 41 – 44.

2014 **Karampelas I.H.**, Kim Y.H., Furlani E.P., *Numerical analysis of laser induced photothermal effects using colloidal plasmonic nanostructures*. (2014) Technical Proceedings of the 2014 NSTI Nanotechnology Conference and Expo, NSTI-Nanotech 2014, 1, pp. 312 – 315.

2014 Berthier J., Brakke K.A., Furlani E.P., **Karampelas I.H.**, Delapierre G., *Open-surface microfluidics*. (2014) Technical Proceedings of the 2014 NSTI Nanotechnology Conference and Expo, NSTI-Nanotech 2014, 2, pp. 113 – 116.

2015 Kattula M., Ponnuru K., **Karampelas I.**, Zhu L., Jia W., Wang T., Lin H., Furlani E.P., *Designing ultrathin film composite membranes: Importance of a gutter layer*. (2015) NSTI: Advanced Materials - TechConnect Briefs 2015, 2, pp. 263 – 266.

2015 **Karampelas I.H.**, Alali F., Furlani E.P., *Plasmonic nanocages as photothermal transducers for laser induced heating and bubble generation*. (2015) NSTI: Advanced Materials - TechConnect Briefs 2015, 4, pp. 375 – 378.

2016 **Karampelas I.H.**, Zhu L., Jia W., Yavari M., Lin H., Furlani E.P., *Analysis of permeance vs. Support porosity for thin film composite membranes*. (2016) Advanced Materials - TechConnect Briefs 2016, 2, pp. 209 – 212.

2016 **Karampelas I.H.**, Liu K., Furlani E.P., *Plasmonic Nanocages as Photothermal Transducers for Nanobubble Cancer Therapy*. (2016) Advanced Materials - TechConnect Briefs 2016, 3, pp. 165 – 168.

2016 Vader S., Vader Z., **Karampelas I.H.**, Furlani E.P., *Advances in magnetohydrodynamic liquid metal jet printing.* (2016) Advanced Materials - TechConnect Briefs 2016, 4, pp. 41 – 44.

2017 **Karampelas I.H.**, Sukhotskiy V., Garg G., Verma A., Tong M., Vader S., Vader Z., Furlani E.P., *Drop-on-demand 3D metal printing.* (2017) Advanced Materials - TechConnect Briefs 2017, 4, pp. 153 – 155.

2017 **Karampelas I.H.**, Gómez-Pastora J., Cowan M.J., Bringas E., Ortiz I., Furlani E.P., *Numerical analysis of acoustophoretic discrete particle focusing in microchannels*. (2017) Advanced Materials - TechConnect Briefs 2017, 3, pp. 174 – 177.

2017 Gómez-Pastora, J., **Karampelas, I.H.**, Bringas, E., Furlani, E.P., Ortiz, I., *CFD Analysis of Particle Magnetophoresis in Multiphase Continuous-flow Bioseparators*, TechConnect Briefs 2017, 3 Biotech, Biomaterials and Biomedical, pp. 170-173.

2018 Gómez-Pastora J., González-Fernández C., **Karampelas I.H.**, Bringas E., Furlani E.P., Ortiz I., *Design of magnetic blood cleansing microdevices through experimentally validated CFD modeling.* (2018) TechConnect Briefs 2018 - Advanced Materials, 3, pp. 170 – 173.

2018 Schneider P., Sukhotskiy V., Siskar T., Christie L., **Karampelas I.H.**, Furlani E.P., Oh K.W., *Additive manufacturing of microfluidic components via wax extrusion*. (2018) TechConnect Briefs 2018 - Advanced Materials, 3, pp. 162 – 165.

2018 Sukhotskiy V., Vishnoi P., **Karampelas I.H.**, Vader S., Vader Z., Furlani E.P., *Magnetohydrodynamic drop-on-demand liquid metal additive manufacturing: System overview and modelling*. (2018) TechConnect Briefs 2018 - Advanced Materials, 4, pp. 114 – 117.

2018 Gupta A., Kitting J., **Karampelas I.H.**, *Numerical modeling of the formation of dynamically configurable L2 lens in a microchannel*. (2018) TechConnect Briefs 2018 - Advanced Materials, 3, pp. 186 – 189.

2018 Gómez-Pastora J., **Karampelas I.H.**, Alorabi A.Q., Tarn M.D., Bringas E., Iles A., Paunov V.N., Pamme N., Furlani E.P., Ortiz I., *CFD analysis and experimental validation of Magnetic droplet generation and deflection across multilaminar flow streams*. (2018) TechConnect Briefs 2018 - Advanced Materials, 3, pp. 182 – 185.

2018 Gómez-Pastora, J., **Karampelas, I.H.**, Bringas, E., Furlani, E.P., Ortiz, I., *Computational analysis of a two-phase continuous-flow magnetophoretic microsystem for particle separation from biological fluids*, Computer Aided Chemical Engineering, 2018, 40, pp. 1183-1188.

2019 González-Fernández, C., Gómez-Pastora, J., **Karampelas, I.H.**, Bringas, E., Ortiz, I., *Optimization of continuous-flow magnetic bioseparators through CFD numerical models*, TechConnect Briefs 2019, pp. 290-293.

2019 Amiri, V., Gómez-Pastora, J., González-Fernández, C., **Karampelas, I.H.**, Bringas, E., Furlani, E.P., Ortiz, I., *CFD Analysis of the Generation and Manipulation of Ferrofluid Droplets*, TechConnect Briefs 2019, pp. 298-301.

Oral Conference Presentations

2012 **Karampelas, I.H.**, Furlani, E.P., *Laser Induced Photothermal Heating and Bubble Generation of Gold Nanoparticles*. 2012 AICHE Annual Meeting, Oct. 28 – Nov. 2, 2012, Pittsburgh, PA.

2013 **Karampelas, I.H.**, Furlani, E.P., Nunez A., Vizzeri, G., *Multiscale Biomechanical Modeling of the Human Eye*. Nanotech 2013 - Conference & Expo, May 12 – 16, 2013, Washington, DC.

2013 Alali, F., **Karampelas, I.H.**, Kim, Y.H., Furlani, E.P., *Analysis of Pulsed-laser Plasmon-enhanced Photothermal Energy Transfer with Applications*. Nanotech 2013 - Conference & Expo, May 12 – 16, 2013, Washington, DC.

2014 **Karampelas, I.H.**, Kim, Y.H., Furlani, E.P., Numerical Analysis of Laser Induced Photothermal Effects using Colloidal Plasmonic Nanostructures. Nanotech 2014 - Conference & Expo, Jun. 15 – 18, 2014, Washington, DC.

2014 Berthier, J., Brakke, K.A., Furlani, E.P., **Karampelas, I.H.**, Delapierre, G., *Open Surface Microfluidics* (invited talk). Nanotech 2014 - Conference & Expo, Jun. 15 – 18, 2014, Washington, DC.

2014 Xue, X., **Karampelas, I.H.**, Liu, C., Furlani, E.P., *A CFD Approach for Predicting Magnetic Field-Directed Particle Transport and Self-Assembly in Microfluidic Systems*. 2014 FLOW-3D Americas Users Conference, Sep. 9-10, 2014, Toronto, ON.

2014 Ponnuru, K., **Karampelas, I.H.**, Wu, J., Ashok, P., Tzanakakis, E.S., Furlani, E.P., *Computational Modelling of a Microcarrier Bioreactor System for Stem Cell Culture Performance Analysis*. 2014 FLOW-3D Americas Users Conference, Sep. 9-10, 2014, Toronto, ON.

2015 Kattula, M., **Karampelas, I.H.**, Ponnuru, K., Zhu, L., Jia, W., Wang, T., Lin, H., Furlani, E.P., *Designing Ultrathin Film Composite Membranes: Importance of a Gutter Layer*. Nanotech 2015 - Conference & Expo, Jun. 14 – 17, 2015, Washington, DC.

2015 Vader, S., Vader, Z., **Karampelas, I.H.**, Furlani, E.P., *Magnetohydrodynamic Liquid Metal Jet Printing*. Nanotech 2015 - Conference & Expo, Jun. 14 – 17, 2015, Washington, DC.

2015 **Karampelas, I.H.**, Alali, F., Furlani, E.P., *Plasmonic Nanocages as Photothermal Transducers for Laser Induced Heating and Bubble Generation*. Nanotech 2015 - Conference & Expo, Jun. 14 – 17, 2015, Washington, DC.

2016 **Karampelas I.H.**, Zhu, L., Jia, W., Yavari, M., Lin, H., Furlani, E.P., *Analysis of Permeance vs. Support Porosity for Thin Film Composite Membranes*. Nanotech 2016 - Conference & Expo, May 22 – 25, 2016, Washington, DC.

2016 **Karampelas, I.H.**, Vader, S., Vader, Z., Furlani, E.P., *Advances in magnetohydrodynamic Molten Metal Jet Printing*. Nanotech 2016 - Conference & Expo, May 22 – 25, 2016, Washington, DC.

2016 **Karampelas, I.H.**, Liu, K., Furlani, E.P., *Plasmonic Nanocages as Photothermal Transducers for Nanobubble Cancer Therapy*. Nanotech 2016 - Conference & Expo, May 22 – 25, 2016, Washington, DC.

2017 **Karampelas, I.H.** Gómez-Pastora, J., Cowan, M.J., Bringas, E., Ortiz, I., Furlani, E. P., *Numerical Analysis of Acoustophoretic Discrete Particle Focusing in Microchannels*, 2017 TechConnect World Conference & Expo, May 14, 2017, Washington, DC.

2017 Gómez-Pastora, J., **Karampelas, I.H.**, Bringas, E., Furlani, E.P., Ortiz, I., CFD Analysis of Particle Magnetophoresis in Multiphase Continuous-flow Bioseparators, 2017 TechConnect World Conference & Expo, May 14, 2017, Washington, DC.

2018 Gómez-Pastora, J., González-Fernández, C., **Karampelas, I.H.**, Bringas, E., Furlani, E.P., Ortiz, I., *Design of Magnetic Blood Cleansing Microdevices through Experimentally Validated CFD Modeling*, TechConnect World Conference & Expo, May 14, 2018, Anaheim, CA.

2018 Gómez-Pastora, J., **Karampelas, I.H.**, Alorabi, A.Q., Tarn, M.D., Bringas, E., Iles, A., Paunov, V.N., Pamme, N., Furlani, E.P., Ortiz, I., *CFD analysis and experimental validation of magnetic droplet generation and deflection across multilaminar flow streams*, TechConnect World Conference & Expo, May 14, 2018, Anaheim, CA.

2019 Amiri, V., Gómez-Pastora, J., González-Fernández, C., **Karampelas, I.H.**, Bringas, E., Furlani, E.P., Ortiz, I., CFD Analysis of the Generation and Manipulation of Ferrofluid Droplets, Nanotech 2019 Conference & Expo, Boston (USA), June 17-19, 2019.

Awards and Honors

2019 **Symposium Co-Chair** (Micro & Bio Fluidics and Lab-on-a-Chip)
TechConnect World Conference 2019
Co-chairing a key conference symposium with Prof. Kwang Oh (University at Buffalo, SUNY).

2011 – 2016 **PhD Tuition Award**
Faculty of Graduate Studies, University at Buffalo
Offered only to the top 5% of applicants.

2015 **Poster Competition Winner**
School of Engineering and Applied Sciences, University at Buffalo
Placed 1st among 14 participants which represent the best from each department in the entire School of Engineering.

2015 **Student Speaker**
Dept. of Chemical and Biological Engineering Graduate Seminar Series, University at Buffalo
Offered only to senior students with proven track record of academic success. Presentation title: *Plasmonic Nanocages as Photothermal Transducers for Laser Induced Heating and Bubble Generation*.

2014 **Poster Competition Winner**
Department of Chemical and Biological Engineering, University at Buffalo
Placed 1st among 53 participants from a variety of chemical engineering research fields.

Skills and Abilities

Management

2020 – 2026 **Simulation group coordinator**
NEMAK, SA
Organized and performed a series of weekly meetings to improve communication and performance of the NA simulation group as well as allocate specific projects and tasks to various team members and determine appropriate deadlines.

2017 – 2019 **Documentation Manager**
Flow Science, Inc.
Supervisor and manager of the product documentation team. Responsibilities include the preparation of CFD model (theory and use) documentation as well as process-specific tutorials.

2016 – 2018 **On-site User Training Manager**
Flow Science, Inc.

Supervisor and manager of the on-site user training program. Responsibilities include the supervision, preparation and delivery of training materials for multiple training levels ranging from Introductory to Advanced.

2011 – 2016 **Lab Manager**
Laboratory of Interdisciplinary Modeling and Simulation, Department of Chemical and Biological Engineering, University at Buffalo
Responsibilities include procurement of hardware equipment, software packages, management of resources and personnel, new student orientation, mentorship of undergraduate, M.S. and M.E. students.

Mentorship

2016 – 2026 **Mentor of new Metal Casting CFD Engineers**
Notable mentions: Jason Bednarski, Jesus Martinez and Nathan LeBlanc.
Area of expertise: High Pressure Die Casting process simulation and modeling.

2012 – present **Mentor of undergraduate and graduate students**
Department of Chemical and Biological Engineering, University at Buffalo
Notable Students:
Keyan Schultes (Graduated 2012: M.E. CE), Project: CFD, Microfluidics. Employed by Corning Inc., Corning, NY after graduation.
Koushik Ponnuru (Graduated 2014: M.S. CE), Thesis: Multiscale Computational Modeling of a Radiantly Driven Solar Thermal Collector. Pursued a Ph.D. degree at University of Massachusetts Amherst after graduation.
Chenxu Liu (Graduated 2014: M.S. CE), Thesis: A Computational Model for Predicting Fully-Coupled Particle-Fluid Dynamics and Self-Assembly for Magnetic Particle Applications. Employed by the Tonawanda Coke Corporation after graduation.
Ting Wang (Graduated 2015: M.E. CE), Project: CFD, Microfluidics
Moon Kattula (Graduated 2015: M.S. CE), Thesis: A Computational Model for Predicting Fully-Coupled Particle-Fluid Dynamics and Self-Assembly, A Theoretical Study
Jianchao Wang (Graduated 2016: M.E. CE), Project: CFD, Microfluidics
Aditi Verma (Graduated 2016: M.S. CE) Project: Application of Computational Transport Analysis: Oil Spill Dynamics
Jaylene Martinez. Project: Ejection and Generation of droplets in capillary channels.

Leadership

2018 – 2019 **Customer Relationship Management (CRM) Project Leader**
Supervisor and manager of the CRM program. Responsibilities included the supervision and management of a unified monitoring and logging system connecting sales, customer satisfaction and finance with company-wide implications.

2018 – 2019 **Metal Casting Customer Satisfaction Leader**
Supervisor of the metal casting technical support team. Responsibilities included the supervision and management of CFD engineers working with customers in the metal casting industry. Provided guidance in helping customers successfully use computational tools for modeling HPDC, LPDC, lost foam, tilt-pour, gravity and other casting processes.

2015 – 2016 **Graduate Student Association Finance Committee Member**
Advised the executive board of the Graduate Student Association at the University at Buffalo on financial and technical matters, examining funding petitions and interviewing applicants, ensuring financial transparency and proper budget management according to Graduate Student Association rules and regulations.

2014 – 2016 **Graduate Student Association Senator**
Acted as a liaison between the Greek Graduate Student Association of the University at Buffalo and the rest of the community, promoting club interests, maintaining and improving public relationship.

Software Skills

General Purpose: Microsoft Office products, SigmaPlot, Minitab
Programming languages: BASIC, Pascal, Fortran 90/95, Visual Basic, MATLAB, C++, Python
CFD Modeling Software: FLOW-3D, FLOW-3D CAST, MAGMA, COMSOL Multiphysics, ANSYS Fluent, ANSYS CFX, openFOAM, PHOENICS. Additional experience on computer applications on a High Performance Computing (HPC) environment
CAD Software: Solidworks, NX, Rhino, Creo

Languages

Fluent: English, Spanish and Greek
Proficient: French