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A *Special Issue* on Modeling and nanofabrication of 1D and 2D materials

The research and development of low dimensional materials have accelerated at an enormous pace. Since the discovery of carbon nanotubes (CNTs) by Iijima in 1991, there have been extensive research efforts on the synthesis, physics, electronics, chemistry and applications of one-dimensional (1D) materials, including nanotubes, nanowires, nanorods, nanofibers, and nanobelts. Recent advances in the modeling of phenomena during nanofabrication along with new methods and mechanics of controllable synthesis of 1D materials have paved the road for applications with increasing social impact, especially in energy generation and storage, bio-detection, wearable devices, specialized coatings, and environment monitoring.

While 1D materials still shows great potential for novel applications, the pioneering research has served as a foundation in establishing the framework for investigating two-dimensional (2D) materials. The work in 2004 by Andre Geim and Konstantin Novoselov, where they demonstrated the isolation of graphene with the simple, yet elegant, "*Scotch Tape*" method has now become the foundation to introductory 2D materials research in laboratories all across the world and has opened the floodgates to a vast library of other 2D layered materials, including the fabrication of heterostructures, all at atomic thicknesses. The nanoscale world has shown to be a place where materials exhibit peculiar and intriguing properties, which are not available at the macro or bulk scale. Examples include extreme mechanical strength, surpassing the strongest man-made steel, to ballistic conduction, where electrons race along great distances without scattering, as can be seen from graphene. The nanoscale world continues to show undiscovered and untapped physics that is now only beginning to shed light. Countries around the world are investing vast sums to bring the realization of 2D materials from the lab bench to commercialization. Evidence of this is seen in the European Union's *Graphene Flagship*, where over 150 academic and industrial research groups have formed a consortium comprised of over 23 countries to bring graphene from the lab bench to real world applications in record time. In addition to Europe's commitment to 2D materials, the United States, through the National Science Foundation and Department of Defense along with other federal agencies, have supported and established a consortium of laboratories to research, develop, and realize 2D materials in applications such as specialized coatings, ultra-sensitive mass detectors, and ultra-strong actuators. Finally, the most impact is being felt from Asian countries, where industrial giants such as LG and Samsung are realizing applications in flexible touchscreens for cell phones, tablets, and wearable devices, to name a few.

To better understand the current state of 1D and 2D materials and future direction, this special issue was established to canvass academia, industry, and government institutions to evaluate the progress in fabrication, modeling, and novel applications of both 1D and 2D materials ranging from carbon nanotubes to transition metal dichalcogenides (TMDs). This special issue in Nano-Structures and Nano-Objects has compiled research and review papers covering many interesting and diverse topics that include photocatalytic fuel cells, novel solutions for anodes in both Sodium and Lithium ion batteries, transparent conductors, nanowires, nanomesh, solar cells, THz applications, anticancer drug carriers, hydrogen evolution reaction of nanosheet, photocatalyst, electrochemical capacitor, and the effect of environment on photoluminescent of WSe_2.

We would like to sincerely thank all authors who submitted their work to this special issue. It is our intent to keep the scientific community abreast with current technological breakthroughs and recent scientific progress in the fast paced research environment of 1D and 2D materials modeling and fabrication and hope some or all of the topics presented achieve this goal.

Dr. Eui-Hyeok Yang is a full professor of Mechanical Engineering Department at Stevens Institute of Technology. He received his Ph.D. degree from Ajou University, Korea. After his postdoctoral training at University of Tokyo and at California Institute of Technology, he joined NASA's Jet Propulsion Laboratory (JPL) where he became a Senior Member of the Engineering Staff. At JPL, he received numerous awards, including NASA ICB Space Act Awards, Bonus (Level B and C) Awards and multiple Class 1 NASA Tech Brief Awards. In recognition of his excellence in advancing the use of MEMS-based actuators for NASA's space applications, he received the prestigious Lew Allen Award for Excellence at JPL in 2003. Since joining Stevens in 2006, he has been responsible for obtaining competitive research funding from several federal agencies including NSF, AFOSR, US Army, NRO, NASA and DARPA (including 6 NSF and 3 AFOSR grants, and 5 NASA and 3 NRO contracts). Overall, Dr. Yang has received more than 35 grants over the course of his career totaling more than $7,500,000. In addition to an active teaching course load, he is credited with advising more than 100 students at the high school, undergraduate, graduate, and post graduate levels. His commitment to contributing to the scientific community is also demonstrated in the more than 150 journals that he has reviewed over the span of his career. Dr. Yang's service to the professional Community also includes formal appointments such as Editorial Board Member of Nature's Scientific Reports, Associate Editor of IEEE Sensors, Associate Editor of Nanoscience and Nanotechnology Letters. He was Division Chair of the ASME MEMS Division. Dr. Yang has provided over 80 keynotes and invited presentations and seminars at various academic and industrial events.

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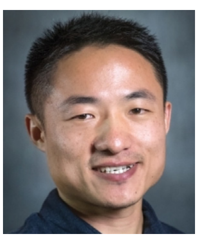
Dr. Kyungnam Kang is a research scientist in the Mechanical Engineering Department at Stevens Institute of Technology. He received his Ph.D. and M.S. degrees from Louisiana State University, USA and B.S. degrees from Chung-Ang University, Korea, graduated *Summa Cum Laude*. His current research interests include synthesis and characterization of low dimensional carbon materials and 2D semiconductors. Dr. Kang holds a novel patent in the synthesis of 2D materials. He received numerous awards, including a travel award from SPIE (2009), KSEA (2016) and proposal award from KEIT (2014). Kang serves as a reviewer for several scientific journals, including ACS Nano, Journal of physics D, Nanoscience and nanotechnology letters and Journal of nanoparticle research.

Dr. Dibakar Datta is an assistant professor of the Mechanical Engineering Department at New Jersey Institute of Technology (NJIT). He joined NJIT in 2016 from Stanford University, where he was a postdoctoral research scholar. Dr. Datta received his Ph.D. from Brown University in 2015 with major in Solid Mechanics and minors in Physics and Chemistry. He was a visiting Ph.D. scholar at the Department of Materials Science and Engineering, the University of Pennsylvania for a year (2014–2015). His research focuses on different themes: modeling of energy storage systems such as rechargeable batteries, mechanics and electronics of nanomaterials (e.g., graphene) and other two-dimensional materials such as Transition Metal Dichalcogenides (TMDs), modeling of imperfections in crystalline materials, and nanomaterials for biological problems. He received 'The President of India Gold Medal' from the governor of the state of West Bengal, India for securing the first rank in the university in undergrad. While a Ph.D. student, his proposals to mentor undergraduates led to prestigious LittleJohn summer funding for two students at the University of Pennsylvania.



Dr. Junjun Ding is an assistant professor of Materials Science and Engineering at Inamori School of Engineering, New York State College of Ceramics at Alfred University. He received his Ph.D. degree from Stevens Institute of Technology, USA and M.S. and B.S. degrees from University of Science and Technology of China. His research interests include scalable micro- and nanomanufacturing, additive manufacturing, nanomaterials, and flexible electronics. He was a recipient of the American Society of Mechanical Engineers (ASME) Travel Award (2016) sponsored by National Science Foundation (NSF), and Travel Grants for the International Conferences on Electron, Ion, and Photonic Beam Technology and Nanofabrication (EIPBN). Dr. Ding served as a program committee member and a session organizer for EIPBN and ASME conferences, and a reviewer of multiple journals including Scientific Reports, Nanotechnology, Journal of Micromechanics and Microengineering, and IEEE Sensors.

Grzegorz (Greg) Hader is a mechanical engineer at the U.S. Army Armaments Research, Development, and Engineering Center (ARDEC), located at Picatinny Arsenal, NJ. Mr. Hader graduated with his B.S. in Mechanical Engineering from Virginia Polytechnic Institute and State University in 2002 and was recruited by ARDEC, where he joined the Fuze and Precision Armaments Directorate, technically supporting inertial measurement unit research and development for precision munitions. His areas of research include modeling, fabrication, and characterization of both NEMS and MEMS sensors and devices utilizing 1D and 2D materials. He is the three-time recipient of the ARDEC Science Fellowship and has been awarded multiple In-house Laboratory Independent Research grants at ARDEC. Mr. Hader is highly active in peer reviews of journal paper publications including IEEE Sensors, Journal of Energetic Materials, Journal of Colloid and Interface Science, Nanoscience and Nanotechnology Letters, Chemistry of Materials, Scientific Reports, and MDPI Sensors. He holds memberships with ASME, IEEE, MRS and ARRL and participates on the ASME MEMS Division board and IEEE Sensors Council.

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