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SPEAKER SERIES

PRESENTS

Programmable Molecular/Nanoscale Building Blocks and Development Strategies for Real-Time, In Vivo Molecular/Nano Sensing Platform

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Classroom and Business Building, Room 122

LECTURE ABSTRACT

Modular assembly of multiple molecular/nanoscale particles into multifunctional structures with arbitrary sizes and shapes has the potential to transform many fields of research, ranging from optoelectronics and nanophotonics to molecular/nano sensing, biosecurity, and nanomedicine. Self-assembly has emerged as a powerful and practical strategy for controlled synthesis of such multifunctional, hierarchical structures of nanoparticles (NP). Despite the promise and recent progress in NP self-assembly, the accurate, scalable, and high-rate modular assembly of heterogeneous nanocomponents into multifunctional nanoarchitectures with specifically designed shapes and functions still remains a challenge. Our research group focuses on a transformative research to develop a nano-building block toolbox ("nanotoolbox") that enables programming matter at a molecular scale, realizing a "next-generation" bio-hybrid multifunctional nano-architecture at all scales and in all three dimensions. This lecture will discuss the progresses in and challenges to the programmable and scalable self-organization of NP nanocomposites with specific shape and function. Also, it will discuss our strategies to realize the control and functionality necessary to overcome the challenges, achieve its promise for "programmable and customizable" integrations of highly functional bio-hybrid systems in desired patterns and geometries, and drive innovations in novel hybrid fused technologies, particularly for in vivo, real-time molecular/nano imaging and sensing in medicine.

SPEAKER BIOSKETCH

Jin-Woo Kim is a Director of Bio/Nano Technology Group and a Professor of Biological Engineering, Biomedical Engineering and Nanoscience & Engineering at the University of Arkansas. He received his first B.S. in Chemical & Biological Engineering from Seoul National University, the second B.S. in Microbiology from University of Iowa, the M.S. in Biology from University of Wisconsin, and the Ph.D. in Biological Engineering from Texas A&M University. His research focus is in the area of Bio/Nano Technology, i.e., biologically inspired nanotechnology, which spans interdisciplinary fields of biological engineering, biomedical engineering, biology, chemistry, and nanotechnology. Learning from biological systems in nature, his research aims to develop more effective and efficient routes to "panoscale" (i.e., 'any' scale) system integration of multifunctional hierarchical structures for biomimetic advanced materials and devices in biological and biomedical applications. He has published over 110 peer-reviewed articles, over 200 presentations with over 70 invited presentations, and 3 patents granted. He received several teaching and research awards and held for leadership positions in international professional societies, including Vice President of Publications in IEEE Nanotechnology Council (2017-2019). He has served on organizing committees for several international conferences, including steering committee members of IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED) and THz-Bio Quantum Forum, and general chair (2015), general co-chairs (2011 and 2017) and program chair (2010) of IEEE-NANOMED. He is a senior editor of IEEE Transactions on Nanotechnology and has been ad-hoc reviewers for leading journals, including Science, PNAS, and Nature Nanotechnology. He is a Fellow of the American Institute of Medical & Biological Engineering (AIMBE) and IEEE Nanotechnology Distinguished Lecturer (2017).

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