ECO-NANOMANUFACTURING OF WATER AND ELECTRONIC DEVICES

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Abstract: Rethinking how we manufacture water and electronics presents an opportunity to enhance their sustainability. Accordingly, based on the commonly used Bruntland Commission's definition of sustainability, we are developing a new eco-nanomanufacturing paradigm. It will meet our current needs but limit greenhouse gas emissions and use of non-renewable resources, among other sustainability-related objectives including minimizing water consumption, so that future generations can also meet theirs. This presentation will focus on eco-nanomanufacturing that involves the use of low-impact feedstocks and low-energy nanomanufacturing processes that also are water efficient and emit low levels of pollution (including greenhouse gases). Moreover, the products are designed for reuse/recycling or biodegradation to benign products. Challenges and opportunities around eco-nanomanufacturing will be highlighted, together with two use cases toward manufacturing of clean water and electronic devices guided by life cycle assessment and techno-economic analysis.

Bio: Junhong Chen is currently Crown Family Professor of Pritzker School of Molecular Engineering at the University of Chicago and Lead Water Strategist & Senior Scientist at Argonne National Laboratory. Prior to coming to Chicago, Dr. Chen served as a program director for the Engineering Research Centers (ERC) program of the US National Science Foundation (NSF). He also served as a co-chair of the NSF-wide ERC Working Group to design the ERC Planning Grants program and the Gen-4 ERC program. Prior to joining NSF in May 2017, he was a regent scholar of the University of Wisconsin System, a Distinguished Professor of Mechanical Engineering and Materials Science and Engineering, and an Excellence in Engineering Faculty Fellow in Nanotechnology at the University of Wisconsin-Milwaukee (UWM). He served as the director of NSF Industry-University Cooperative Research Center (I/UCRC) on Water Equipment & Policy (WEP) for six years. He founded NanoAffix Science LLC to commercialize real-time water sensors based on 2D nanomaterials. Dr. Chen received his Ph.D. in mechanical engineering from University of Minnesota in 2002 and was a postdoctoral scholar in chemical engineering at California Institute of Technology from 2002 to 2003. His current research focuses on nanomaterial innovation for sustainable energy and environment. Dr. Chen has published over 260 journal papers and has been listed as a highly cited researcher (top 1%) in materials science/cross-field by Clarivate Analytics over the last four years. Dr. Chen's research has led to 9 issued patents, 5 pending patents, and 13 licensing agreements. He is a pioneer in technology commercialization through exemplary industrial partnership and the university start-up company. Dr. Chen is an elected fellow of National Academy of Inventors and the American Society of Mechanical Engineers (ASME). His start-up company, NanoAffix, is a recipient of the 2016 Wisconsin Innovation Award.