

Advanced Nanomaterials-Based Manufacturing Platform for Printed Sensors, Electronics, Energy and Material Applications

The NSF Center for High-rate Nanomanufacturing (CHN) has developed a novel reconfigurable manufacturing technology platform that operates at ambient temperature and pressure, is water-based, material-independent and low energy, and requires small capital investment. It has been used to make structures and devices across length scales. The center has developed templates with nanoscale features to assemble and print structures down to 20 nm at room temperature and pressure in a short time and over a large area. For example, a new biosensor chip (0.02 mm²) capable of simultaneously detecting multiple biomarkers has been demonstrated. The biosensor has a detection limit that is 200 times lower than current technology. The center develops the fundamental science and engineering necessary to manufacture a wide array of applications ranging from electronics, energy, sensors and materials to biotechnology. A directed assembly-based nanomanufacturing factory could be built for as low as \$50 million, a fraction of today's cost, making nanotechnology accessible to millions of new innovators and entrepreneurs and unleashing a wave of creativity in the same way as the advent of the PC did for computing.

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Ahmed A. Busnaina, Ph.D. is the William Lincoln Smith Chair Professor and Director of National Science Foundation's Nanoscale Science and Engineering Center (NSEC) for High-rate Nanomanufacturing (CHN) at Northeastern University, Boston, MA. He is internationally recognized for his work on nano and micro scale defect (particulate and chemical) mitigation and removal in semiconductor fabrication. He also involved in the fabrication of nano-scale wires, structures and interconnects. He specializes in directed assembly of nanoelements and in the fabrication of micro and nanoscale structures. He served as a consultant on micro contamination and particle adhesion issues to the semiconductor industry. He has authored more than 470 papers in journals, proceedings and conferences. His research support exceeds 47 million dollars. He is on the editorial advisory board of Semiconductor International, the Journal of Particulate Science and Technology. He is a fellow of the American Society of Mechanical Engineers, and the Adhesion Society, a Fulbright Senior Scholar and listed in Who's Who in the World, in America, in science and engineering. He was awarded the 2006 Nanotech Briefs National Nano50 Award, Innovator category, the 2006 Outstanding Faculty Research Award, Northeastern University 2006, the 2005 Aspiration Award, Northeastern University.