NANO HIGHLIGHT
Center for Scalable and Integrated NanoManufacturing (SINAM)

NSF NSEC Grant 0327077

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Overview. Center for Scalable and Integrated NAno Manufacturing (SINAM) embraces a vision for a new manufacturing paradigm that combines fundamental science and technology in nano-manufacturing, and that will transform laboratory science into industrial applications, in nano-electronics, biomedicine, and in traditional industries. We have organized an exceptional team of scientists and engineers from six institutions: UCLA, UC Berkeley, Stanford, UCSD, University of North Carolina and HP Labs to embark on this important mission. SINAM is targeting a new nano-manufacturing paradigm based on fundamental scientific research; one that will enable an industrial quantum-leap by working closely with industry; and that will forge a new education platform for multidisciplinary science and engineering through integrating research and education.

Goals and Approaches. The current nano-technology revolution is facing several major challenges: to manufacture nanodevices below 20 nm, to fabricate 3D complex nanostructures, and to heterogeneously integrate multiple functionalities. To tackle these grand challenges, SINAM set its goal to develop a new manufacturing paradigm that integrates an array of new nano-manufacturing technologies, including the Plasmonic Imaging Lithography and Ultramolding Imprint Lithography aiming toward critical resolution of 1-50 nm and the hybrid top-down and bottom-up technologies to achieve massively parallel integration of heterogeneous nanoscale components into higher-order structures and devices. Furthermore, SINAM research is driven by a strong system focus with the emphasis on manufacturability, scalability, and reliability. An innovative concurrent design and nano-CAD platform will be developed to reduce the prototyping cycle, and enhance the scalability. SINAM will investigate the key factors in both design and manufacturing for reliability

Education. SINAM identifies its educational mission in addressing critical high technology work force needs from K-12 school to university graduate level, through its innovative education program. Prior to its first launching in the summer of 2004, SINAM's Nano-Manufacturing Summer Academy (NMSA) program is recruiting high school and undergraduate students around the country. Among the total of 14 applicants, 5 female students and 1 Hispanic/Latino student have submitted their applications. SINAM researchers are working with Center X to develop the course module for high school science teachers. The Graduate Young Investigator (GYI) Program provides graduate students an excellent experience for the student to be a "driver and director" in research and will also endow them with an interdisciplinary research spirit. Four new courses have been developed under the sponsorship of SINAM and two other courses were expanded to include materials from SINAM's research collaborations.

Scientific impact. Nano-manufacturing will have a ground-breaking impact on the new era of manufacturing and industrial production. SINAM serves as a unique bridge in transforming nanoscale science into a manufacturing revolution. The new manufacturing technologies developed at SINAM will open an exciting gateway to applications in computing, telecommunication, photonic, biotechnology and medicine.