NSF – EC Workshop on
Nanomanufacturing and Processing – Research, Education,
Infrastructure, Security, and Resources
San Juan, Puerto Rico, January 5-7, 2002

Committee Members
Drs. Harris Doumanidis, Julie Chen, Fabio Biscarini,
Carlo Taliani, and Ranga Komanduri

Summary Report

By

Ranga Komanduri
Oklahoma State University
Stillwater, OK
Feb 11, 2008
Goals and Objectives

**Goals**

To join forces (NSF and EC program agencies) to catalyze progress in research and education in the emerging fields of nanomanufacturing and processing.

**Objectives**

- Research milestones in (a) nanomaterials and nanomanufacturing; (b) pro-tototyping, scale-up, and integration issues in nanomanufacturing, (c) measurement and metrology, and (d) theory, modeling, and simulation;
- Security issues;
- Resources—equipment, human resources, and funding;
- NSF-EC Collaboration—cooperative research programs and educational exchanges, sharing of nanomanufacturing research facilities and
- Interactions in general with the community—at-large.
Nanomanufacturing

- Encompasses all processes aimed toward building of nanoscale structures, features, devices, and systems in 1D, 2D, and 3D.

- Includes both bottom-up and top-down processes.

**Examples of bottom-up processes:**
Contact printing, imprinting, spinodal wetting/dewetting, laser trapping/tweezer, assembly and joining (self- and directed-assembly), tem-plate growth, electrostatic (coatings, fibers), colloidal aggregation, and 2-photon confocal processing.

**Examples of top-down processes:**
Lithography (e-beam, ion beam, scanning probe, optical near field), thin film deposition and growth, laser beam processing, mechanical (machining, grinding, lapping, pol-ishing), and electro-chemical material removal processes.
Impact of Nanomanufacturing

- Nanomaterials technology;
- Information technology;
- Nanodevices including "nanosemiconductors,"
- Molecular electronics, and spintronics;
- Nanobiotechnology-diagnostics, implants, therapeutic delivery;
- Safety and security aspects including sensors, adsorbents/filters/decontamination; and NEMS/nanorobots.
Specific Objectives

- **Research Milestones**
  - Materials & Manufacturing
  - Manufacturing: Prototyping, Scale-up, and Integration
  - Measurements and Metrology
  - Theory, modeling, and simulations

- **Security Issues**

- **Resources**
  - Equipment and Facilities
  - Human Resources
  - Funding Distribution