

Call for Papers

Quality, Sensing and Prognostics Issues in Nanomanufacturing

IIE Transactions

**Joint Special Issue of
the IIE Transactions on**

**Quality and Reliability
Engineering (QRE)**

and

**Manufacturing and
Design (MD)**

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Research Issues in Nanomanufacturing

The recent years have seen the emergence of new technologies for processing materials and creating artifacts with features having at least one dimension in the nanometer range. These technologies are collectively termed nanomanufacturing processes. These novel technologies offer opportunities for developing material structures and products with unprecedented combinations of physical, chemical and mechanical properties. Such material structures and products are of vital interest to a broad spectrum of industries, including automotive, aerospace, defense, biomedical and security sectors. As these technologies have started to mature, the systems issues necessary to translate these into technologically and economically viable manufacturing processes have started to take the center-stage.

Addressing various systems issues has been recognized as an important element for scaling-up the current nanomanufacturing technologies to viable manufacturing processes. Among these, the issues pertaining to quality and reliability, metrology, sensing and control as well as process planning are of immense relevance to researchers in Industrial Engineering (IE) and related disciplines. Recently the National Science Foundation (MES program) has sponsored a workshop (www.coe.neu.edu/nanophm) to focus exclusively on the issues that can benefit from the contributions of IE researchers. This workshop has attracted over 50 researchers, the majority from IE departments in US Universities. This workshop has articulated issues and opportunities in the following five themes, all of which are immense relevance to IE discipline: yield and process design, quality and reliability, sensing and prognostics, systems planning and control, and cost and scale-up issues.

Special Issue of IIE Transactions

The purpose of this special issue is to promote and present the emerging research results in the quality, reliability, sensing, planning and control issues in nanomanufacturing. We believe that wider dissemination of research works that address the pressing needs of nanomanufacturing systems will benefit both academe and industry. In addition to disseminating the recent research, the special issue can attract broader spectrum of nanomanufacturing researchers to consider IIE Transactions as a journal of choice for disseminating systems, quality and control research in nanomanufacturing. The manuscript review will follow the standard IIE Transactions procedures.

We seek innovative works that address issues vital for translating and scaling-up the current (lab-scale) nanomanufacturing technologies towards technologically, environmentally, and economically viable manufacturing processes. The desired topics include, but not limited to:

- Data fusion of multiple information sources (e.g., design, on-line sensors, inspection) for process modeling
- Statistical modeling of materials, geometric/physical structures, and transformations in nanomanufacturing
- Experimental optimization and process design
- Reliability modeling in nano-scale components and products
- Real-time sensing of nanomanufacturing processes
- Anomaly detection, prognostics and mitigation in nanomanufacturing
- Active control and process adjustment for quality improvement
- Economic/environmental impact, cost assessment and optimization of nanomanufacturing systems
- Process planning issues in nanomanufacturing systems
- Nanomanufacturing process modeling for repeatability and yield improvement
- System informatics and control in nanomanufacturing