

Abstract

**Instrumentation, Metrology, and Standards for Nanomanufacturing
Challenges Facing the Chemical Industry**

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Nanomaterials present a tremendous opportunity for the U.S. chemical industry to introduce a host of new products that could energize our economy, solve major societal problems, revitalize existing industries and create entirely new businesses. Estimates of potential market size run into the billions of dollars. The U.S. chemical industry has successfully leveraged public investment in basic chemical sciences research in the past and will, undoubtedly, continue to do so in the future. To overcome the traditional time lag between funding of scientific research and significant commercialization, however, industry, government and academic experts proposed a new, solution-oriented roadmap to nanomaterials development – Nanomaterials by Design. This novel approach envisions simultaneous pursuit and integration of R&D in fundamentals & synthesis, manufacturing & processing, metrology & characterization, and modeling & simulation. Since publication of the roadmap in 2003, considerable funds have been expended on nanoscience research but major challenges remain particularly in the areas of environment, health and safety as well as the development of practical design tools.