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**Sent:** Wednesday, October 24, 2012 12:15 PM  
**To:** nnmi\_comments  
**Subject:** NNMI Comments

Dear Sir/Madam:

I would like to make a case for an important innovative manufacturing technology that may be considered for the proposed National Network for Manufacturing Innovation (NNMI). I believe the proposed technology concept falls under the topic of: Development of Technologies with Broad Impact

**Advanced Manufacturing Technology for Stoichiometry Control in Multicomponent Thin Film and Bulk Materials:**

In many materials, especially stoichiometric compounds, the physical properties needed for the desired application are extremely sensitive to minor variations in stoichiometry (compound film photovoltaics, thermoelectrics, superconductors, magnetic materials, etc.). Since many of such materials are only stable at low temperatures (<600 C), conventional ingot metallurgy or casting techniques can seldom be employed. A variety of techniques based on powder metallurgy, solution chemistry, vapor deposition, rapid solidification can be employed for synthesis; however maintaining the desired stoichiometry, purity and microstructure over large areas needed for manufacturing such materials is very difficult to achieve. The situation is made even more difficult if some of these stoichiometry-sensitive materials are volatile (high vapor pressure) at typical annealing or heat treatment temperatures that are often needed for microstructural control. Many multicomponent materials containing low-melting point elements (Zn, Bi, Se, S, Sb, Mg, etc.) are especially susceptible to volatile losses during manufacturing processes that require moderate temperatures. Such losses can result in unintended changes in the composition/stoichiometry and hence result in a deterioration of the properties with increasing time of exposure.

It is recommended that the AMNPO makes a request for new or improved manufacturing techniques and approaches to address this problem.

Best regards,  
Nagraj

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