LLNL-ABS-677123

Advanced foams and nanomaterial synthesis for science and security applications

Glenn A. Fox
Physical and Life Sciences
Lawrence Livermore National Laboratory

Abstract

Technology and innovation often begins with new advanced materials with tailored properties. The ability for the deterministic synthesis of materials with controlled multi-scale morphology and structure is critical in imparting novel properties into resultant bulk materials for security applications.
The first part of this talk will focus on the production of advanced new and novel inorganic, organic, and organometallic foam materials from the sol-gel polymerization process. The resultant materials have interest in areas of high energy density physics, energy storage materials and as feedstock for advanced manufacturing.
The remainder of the talk will focus on new methods of nanomaterial synthesis and production. With the development of advanced manufacturing techniques, the requirements placed upon the material feedstocks—e.g., shape, size purity, doping—requires new methodology for production and eventual material scale-up. Moving from traditional, iterative and time-intensive synthesis procedures, to automated, continuous flow synthesis platforms can accelerate material synthesis and discovery and earlier adoption into technology platforms. Results from initial continuous flow system experiments will be highlighted, focusing on how such a platform allows dynamic control during materials synthesis and start to create multiple “pre-programmed building blocks” that can be assembled to manipulate materials properties.