Microfluidic Tools for Nanomaterial Synthesis

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The past three decades have seen considerable progress in the development of microscale systems for use in the chemical and biological sciences. Interest in microfluidic technologies has driven by concomitant advances in the areas of genomics, proteomics, drug discovery, high-throughput screening and materials science, with a clearly defined need to perform rapid measurements on small sample volumes. At a basic level, microfluidic activities have been motivated by the fact that physical processes can be more easily controlled when instrumental dimensions are reduced to the micron scale. The relevance of such technology is significant and characterized by a range of features that accompany system miniaturization. My lecture will discuss how the spontaneous formation of droplets in microfluidic systems can be exploited to perform a variety of complex chemical workflows, and why the marriage of such systems with a range of optical spectroscopies provides a direct route to high-throughput and high-information content experimentation. Particular focus will be given to the synthesis of chalcogenide- and perovskite-based nanomaterials.