**Integrated Micro- and Nanofluidic Devices for Single-Particle Reactions and Measurements**

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We are developing integrated micro- and nanofluidic devices to react, size, and separate individual micro- and nanoscale particles, e.g., virus capsids, bacteria, and nanocrystals, with improved spatial and temporal resolution. To develop these integrated systems, we design in-plane architectures into which a range of functions can be combined, e.g., mixers, reactors, filters, pores, separators, and lenses. We have applied these systems to a range of problems. In one example, reactions are directly coupled with particle-size measurements to characterize assembly and disassembly of virus-like particles. In a second experiment, microlens arrays are disposed in microchannels to combine optical forces with microfluidic flows for size-selective separation of particles. Third, microchannel arrays confine the growth of bacteria in one dimension to simplify image analysis for tracking bacterial development at the subcellular level. In a fourth example, two-phase flow isolates nanocrystals within oil droplets to assemble the nanocrystals into superparticles.