There are Advantages of Thinking Small!

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Our group at Oak Ridge National Laboratory has been performing chemical measurements in micrometer domains for nearly two decades. Early work started with laser induced fluorescence measurements in micrometer diameter droplets that allowed the detection of single chromophores with high signal-to-noise ratio. These experiments led us into the area of real-time characterization of aerosol particles, where particles are extracted from the atmosphere, then sized and chemically characterized on the fly. In the late 1980s, we began work on the fabrication of micrometer scale channels in which we could perform chemical and biochemical experiments including chemical separations. The early notion was that microfabricated chemical instrumentation could be used as robust chemical sensors, but the technology has also had a significant impact on laboratory experimentation. More recently, we have applied miniaturization concepts to mass spectrometry and ion mobility detection and we are shrinking microfluidics to the nanometer domain. A brief overview of these topics will be presented.

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