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Quantum Dots for Velocity and Thermal Measurements in both Liquid and Gas Microflows JEFFREY GUASTO, KENNETH BREUER, Brown University — Micro/nano-scale velocity and temperature measurements are demonstrated using quantum dots (QDs). The small size and well-described temperature variation of QDs make them attractive thermal-fluid probes for micro and nanoscale systems. Particle tracking velocimetry (PTV) has been demonstrated previously using nanometer-sized QDs and in this talk we present results from both liquid and gas phase flows, demonstrating improved optical detection and statistical particle tracking techniques. QDs are also known to exhibit intensity variations with temperature due to changes in quantum efficiency. We present results on the measurement of two-dimensional temperature fields based on these intensity variations. Using a single intensified camera as a detector, coupled to an image-splitting two-color filter system to separate images by wavelength, we show that it is possible to combine measurements of both velocity and temperature.

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