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Micro-PIT/V — Simultaneous temperature and velocity fields in microfluidic devices[1] TAIT POTTEBAUM, University of Southern California — The use of encapsulated thermochromic liquid crystals (TLC) for the simultaneous measurement of temperature and velocity fields in microfluidic devices has been demonstrated. Implementation of TLC thermometry at the micro-scale is significantly different than at the macro-scale due to the constraints on imaging and illumination configurations and the proximity of the measurements to interfaces and surfaces from which light will scatter. Unlike in micro-PIV, wavelength filtering (such as with fluorescent particles) cannot be used to remove undesired reflections, because the temperature information is carried by the particle color. Therefore, circular polarization filtering is used, exploiting the circular dichroism of TLC. Micro-PIT/V will enable new investigations into the physics of microfluidic devices involving temperature gradients, such as thermocapillary actuated devices and many "lab-on-a-chip" applications involving temperature sensitive chemical and biological processes. In addition, the design of operational devices can be improved by applying micro-PIT/V to the characterization of prototypes.

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