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Simultaneous measurement of velocity and temperature fields in micro-scale flow and its application to electrokinetic flow BEOMJOON LEE, Seoul National Univ., SONGWAN JIN, UCSF, YOUNG WON KIM, JUNG YUL YOO, Seoul National Univ. — In this research, a technique of simultaneously measuring the velocity and the temperature in micro-scale flow is proposed. This method uses particle tracking velocimetry (PTV) for measuring the velocity and laser induced fluorescence (LIF) for measuring the temperature. To measure the accurate velocity and temperature, images for PTV and for LIF are separated by using two light sources and a shutter which is synchronized with a camera. By using only one camera, measurement system can be simplified and the error from complicate optical system can be minimized. Error analyses regarding the concentrations of fluorescent dye and particle and the light source fluctuation are also conducted. It is found that the error of the temperature and the velocity highly depends on the concentration of fluorescent particles which are used for PTV. This technique is applied to the simultaneous measurement of the velocity and the temperature in the electrokinetic flow. It is found that the velocity and temperature vary with the electric field strength and the concentration of electrolyte. Also, it is found that the effect of Joule heating increases the electrokinetic velocity.

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