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Droplet Trajectory Control Using Light-Induced Thermocapillary Effects in a Microchannel JUNE WON, SEUNGMIN KANG, SIMON SONG, Department of Mechanical Convergence Engineering, Hanyang University — Controlling droplets is one of the important functions on a microfluidic chip. Marangoni effects induced by interfacial tension gradient has been paid attention due to its strong driving force on a droplet by means of droplet control. Solutal-capillary effects occurs when the interfacial tension gradient is induced due to the transport of surfactant molecules. We aim to investigate light-induced solutalcapillary effects on a droplet trajectory. Unlike few previous studies, we illuminate a continuous phase with a laser beam, in order to minimize possible damage or property change to target molecules contained in droplets. A mixture solution of black metallic ink and oleic acid is used for the continuous phase fluid. DI-water is the disperse phase. As a result, we found that the trajectory shifting increases with increasing the laser power and the droplet diameter and decreasing the droplet velocity. The magnitude of Marangoni force was estimated to be about 100 nN by assuming quasi-equilibrium between drag force and Marangoni force. As an application of this technique, we successfully routed droplets toward one of three outlets at higher than 95% success rate on demand.

June Won
Hanyang University

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