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Measurement of velocity distribution of fluid flows in nanochannel using evanescent wave-based particle velocimetry YUTAKA KAZOE, YOJIROU HIRAMATSU, KAZUMA MAWATARI, TAKEHIKO KITAMORI, The University of Tokyo, KITAMORI TEAM — The field of nanofluidics for single molecule analysis, ultra filtration and energy conversion has been expanded with recent micro- and nanotechnology. Since liquids in nanospace with dominant surface effects are in a transitional regime from single molecules to continuum, specific fluid properties different from bulk can be expected. Previously, our group has revealed unique properties in size-regulated 10-1000 nm spaces such as higher viscosity, lower dielectric constant and higher proton mobility. However, fluid flows in the nanochannel are still unknown owing to lack of measurement method because nanochannel is smaller than light wavelength. For breaking through the limitation, evanescent wave light, which exponentially penetrates from the surface within 100 nm-order distance, is a key optical phenomenon. In this study, we developed evanescent wave-based particle tracking method for measuring flow profile in nanochannel. 10 nm-order fluorescent tracer materials were used in the measurements, and the position of tracer in the nanochannel was estimated from the brightness. The method was demonstrated in measurements of pressure driven flows in a nanochannel.

Yutaka Kazoe
The University of Tokyo

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