Abstract Submitted
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Two-Photon Absorption Based Nanoscopic Velocimeter[1] AUDREY WANG, AKRM ABDALRAHMAN, JIANYU DENG, Biomedical Engineering Program, University of South Carolina, Columbia, GUIREN WANG, Biomedical Engineering Program, Department of Mechanical Engineering Program, University of South Carolina, Columbia — Most velocimeters in micro/nanofluidics rely on particles as flow tracers, such as micro Particle Image Velocimetry (μPIV). However, for many microflows, such as electrokinetic and near wall flow, magnetophoresis, acoustophoresis, photophoresis and thermophoresis, particles have different velocity from their surrounding fluids. Although most molecular tracer based velocimeters can use neutral dye to measure average velocity, their temporal and spatial resolution are limited. Stimulated emission depletion (STED) based laser-induced fluorescence photobleaching anemometer (LIFPA), i.e. STED-LIFPA has achieved 70 nm spatial resolution. However, STED nanoscopy is very complicated for most users. Here we developed a two–photon absorption LIFPA (TP-LIFPA), which is relatively easier to operate. TP-LIFPA can take advantage of the two–photon microscopy to increase spatial resolution. We use a femtolaser to excite a dye. A microcapillary tube is used to test the feasibility of TP-LIFPA. TP-LIFPA can successfully measure the velocity profile in the capillary. The resolution of TP-LIFPA is estimated to be about 90 nm. The work indicates TP-LIFPA is a new promising nanoscopic velocimeter for interfacial flows, especially within 100 nm at the interfacial area between two phases in the future.

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