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Investigation of flow velocity profile in a nanocapillary GUIREN WANG, AN ZOU, FANG YANG, University of South Carolina, Columbia — In order to understand transport phenomena in nanofluidics, we study the flow velocity profile in a nanocapillary. Laser Induced Fluorescence Photobleaching Anemometer (LIFPA) and Stimulated Emission Depletion (STED) are combined to establish a far-field nanoscopic velocimeter for flow velocity measurement in a nanochannel. LIFPA uses molecular dye as tracer to avoid issues involved in particles as tracer in PIV, when one dimension of the channels is nearly in the same order of particle diameter. STED is applied to overcome conventional diffraction limit in physics to increase spatial resolution. To apply LIFPA, calibration is first required to establish the relationship between the fluorescence intensity signal and flow velocity. Current monitoring, time-fly of fluorescence and metering from syringe pump are used for the calibration respectively. Then the velocity profile is measured with a spatial resolution of about 70 nm in a nanocapillary with inner diameter of 360 nm. The conductivity influence on the velocity profile is investigated.

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