Title	**Measurements of electric double layer between electrolyte-glass interface by evanescent wave light illumination**
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Abstract	A novel measurement technique using large-area evanescent wave light illumination and fluorescent dye has been devised to investigate the spatial and temporal structure of electric double layer (EDL) in the vicinity of the surface of microchannel. A laser beam was directed to a hexagonal prism and refracted through the prism at an angle of incidence of 76.5°, undergoing total internal reflection at an interface between an electrolyte and the surface of silica cover glass. The evanescent wave was generated with the characteristic penetration depth of 88 nm, which directly penetrates into the EDL. An illumination area of 6.85 mm × 2.6 mm was obtained to measure the two-dimensional distribution of EDL in the junction area of T-shaped microchannel. The fluorescent intensity from Alexa Fluor 546, which produces the negative ions in a HEPES buffer at constant pH of 7.2, was detected by a cooled CCD camera attached to a microscope. A spatial resolution of 5 µm × 5 µm was achieved by using a 10× objective lens. Calibration curves, as shown in figure I, depicting the relationship between the fluorescent intensity and the EDL thickness, i.e., the Debye length, was prepared and showed that the fluorescent intensity was decreased with increasing values of the Debye length. Using this relationship, the spatial distribution of EDL in electroosmotic flow was obtained, as illustrated in figure II. It can be concluded that the spatial distribution of EDL thickness is dependent on the molecular diffusion of K+.
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