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Shear Flow induced Electrical Current Generation CLAUS-DIETER OHL, SILVESTRE ROBERTO GONZALEZ AVILA, CHAOLONG SONG, LUONG TRUNG DUNG, Nanyang Technological University — Electro-osmotic flows are driven by an electric potential difference along a channel where the driving force is acting very close to the boundary at the electric double layer (EDL). The charge separation within the EDL gives rise to an electric current. Conversely, one may expect that a strong shear flow can induce an electric current that could be picked up with electrodes and a closed circuit. Previous experiments relied on a steady free jet at a nozzle exit driven by a strong pressure gradient [1]. Here we utilize a laser induced cavitation bubble near an electrode equipped surface to generate strong shear from the impinging jet. Correlation of high-speed recordings of the spreading jet with current measurements reveals that the shear stress is causing the electric current. We make an attempt to calibrate this sensor in a better defined shear flow within a microfluidic channel.

[1] A.M. Duffin and R.J. Saykally, "Electrokinetic Power Generation from Liquid Water Microjets," J. Phys. Chem. C 112, 17018-17022 (2008).

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