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Digital Flow Control of Electroosmotic Pump: Onsager Coefficients and Interfacial Parameters Determination ZULI XU, Department of Physics, the Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong (PR China), JIANYING MIAO, Nano and Advanced Materials Institute Limited, Hong Kong (PR China), NING WANG, PING SHENG, Department of Physics, the Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong (PR China) — Electroosmosis (EO) and streaming potential (SP) are two complementary electrokinetic processes related by the Onsager relation. In particular, electroosmotic pump (EOP) is potentially useful for a variety of engineering and bio-related applications. By fabricating samples consisting of dry-etched cylindrical pores ($50\ \mu\text{m}$ in length and $3.5\ \mu\text{m}$ in diameter) on silicon wafers, we demonstrate that the use of digital control via voltage pulses can resolve the flow regulation and stability issues associated with the EOP, so that the intrinsic characteristics of the porous sample medium may be revealed. Through the consistency of the measured electroosmosis and the streaming potential coefficients as required by the Onsager relation, we deduce the zeta potential and the surface conductivity, both physical parameters pertaining to the liquid-solid interface.

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