

Abstract Submitted
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Concentration-Polarization, Electro-Convection and Colloid Dynamics in Microchannel-Nanochannel Interface Devices GILAD YOSSIFON, NETA LEIBOWITZ, YOAV GREEN, URI LIEL, JARROD SCHIFFBAUER, SINWOOK PARK, Technion - Israel Institute of Technology — Understanding concentration-polarization (CP) and electroconvection processes along with colloid dynamics in microchannel-nanochannel/membrane interface devices are of particular interest in the field of micro- and nano-fluidics. Our design consists of a nano-slot/permselective membrane bounded by two micro-chambers, wherein we introduce dispersed colloids. Here we report various curious phenomena occurring in these systems. Among them: dielectrophoretic trapping of colloids at the nanoslot entrance in conjunction with the formation of electro-convective instability induced vortices; accumulation of colloids due field-focusing gradient effects within the diffusion layers; depression of the slope in the Warburg branch of the electrochemical impedance spectrum with increasing dc bias voltage as a result of nanochannel net electro-osmotic flow; suppression of the diffusion layer length via AC electrokinetics and its effect on ion transport; anomalous resistance minimum and unique chronopotentiometric signatures due to non-ideal nanochannel permselectivity. All of these stand as examples that highlight the essential differences between fabricated straight nanoslot and permselective membrane systems.

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