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Primary, Secondary and Tertiary Vortex Formation in the Ion Concentration Polarization FRANCISCO J. DIEZ, Rutgers, The state University of New Jersey, SRINIVAS HANASOGE, Georgia Institute of Technology — The experimentally observed formation of multiple micro-vortices in the ion concentration polarization region (ICP) is presented. This is attributed to non-uniform electrokinetic phenomenon effects in the ICP such as the local increase in the electric field due to the change in the electrolyte concentration. Experimentally, the ICP is induced by a patterned nanoporous self-assembling membrane integrated inside a single microchannel. Bottom view images of the channel in the depletion region reveals the to-and-fro motion of micro particles which are a projection of a primary vortex. Side view images of the channel reveal the existence of not one, but a series of three vortices all rotating in the same direction and decreasing in size. We propose a model that predicts the formation of these vortices. It shows how the field amplification together with a 2-Dimensionally varying concentration profile is responsible for these multiple vortices.

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