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Chronopotentiometric response of non-ideal ion selective microchannel-nanochannel interface device NETA LEIBOWITZ, JARROD SCHIFFBAUER, SINWOOK PARK, GILAD YOSSIFON, Technion - Israel Institute of Technology — The passage of an electric current through an ion permselective medium (e.g. membranes and nanochannels) under an applied electric field is characterized by the formation of ionic concentration gradients which result in regions of depleted and enriched ionic concentration at its opposite ends, i.e. concentration polarization. As a result, it can be shown that the chronopotentiometric response of an ideal permselective interface (e.g. permselective membranes) is a monotonic function of the voltage with time regardless of the current intensity. In contrast, a microchannel-nanochannel interface device exhibits a non-monotonic chronopotentiometric response for overlimiting currents. This is shown both numerically and experimentally to result from the non-ideal ion permselectivity of the fabricated nanochannels. This is further supported using experimental visualization techniques that indicate the existence of concentration-polarization within the nanochannel itself and not only within the microchannels.

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