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Rectification, Gating Voltage and Interchannel Communication of Nanoslot Arrays Due to Asymmetric Entrance Space Charge Polarization GILAD YOSSFON, YU-CHEN CHANG, HSUEH-CHIA CHANG, University of Notre Dame — A nanochannel array with homogenous surface charge and height (i.e. uniform electro-chemical potential) but with asymmetric channel separation at the entrances is shown to exhibit strong rectification and gating type I-V characteristics at large voltage. Unlike previous low-voltage Ohmic studies of ionic current rectification within nano-pores/channels, which is attributed to intrinsic non-uniformity of the electro-chemical potential along the nanochannel, the high-voltage rectification of asymmetric nanochannel array is due to asymmetric space-charge polarization and inter-channel communication at the entrances. This entrance polarization that controls the current flux at high voltages can overlap across nanochannels to render the array current very distinct from the collective current across isolated channels.

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