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Electronic Bias and Debye Length Calculations across Solid-state Nanopores for Self-referencing Arrays MUHAMMAD USMAN RAZA, Nano-Bio Lab, University of Texas at Arlington, Arlington, TX 76019, USA, SAJID SALEEM, Department of Electrical and Power Engineering, National University of Sciences and Technology, Karachi, Pakistan, WAQAS ALI, SAMIR M. IQBAL, Nano-Bio Lab, University of Texas at Arlington, Arlington, TX 76019, USA — Solid-state nanopores have been used as sensors for many types of biological entities. One application is the detection of disease biomarkers from body fluids. This requires selectivity in nanopores as well as high throughput of analysis. Generally, single nanopore is used for measurements but for high throughput and self-referenced selectivity, multiple nanopores are required on the same chip. To exclude the effects of the ionic current flowing through one nanopore from the adjacent nanopores, effects of electronic bias and Debye length were calculated. The simulations showed optimal distances needed between the nanopores and their measurement electrodes. A number of parameters like nanopore diameter, distance of electrodes from nanopores and amplitude of bias voltage showed dramatic effect on the Debye length. The simulation results were compared with the experimental data.

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