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Charged Nanoparticle Translocation through solid state nanopores fabricated using different techniques SANTOSHI NANDIVADA, JIALI LI, MOURAD BENAMARA, Univ of Arkansas-Fayetteville — Solid-state nanopores are widely used for detection of biomolecules and small particles by measuring the pore resistance change when the molecules or particles are electrophoretically driven through. In this work, we use well-characterized spherical nanoparticles and long chain double-stranded DNA molecules to study the interactions of these nanoparticles and voltage biased solid-state nanopores. Charged nanoparticles of $\sim$ 30nm or smaller are used to study the volume and charge dependence of their translocation dynamics in solid-state nanopores made from silicon nitride. Nanopores fabricated using two different techniques are used in this study: one is to use noble gas ion beams to sculpt $\sim$ 100 nm pores milled by focused ion beam; another is to use e-beam lithography to first write a micrometer size pattern, then to thin the patterned region, and finally drill a nanopore in the thinned micrometer region by a high energy electron beam in a TEM. The 3D geometry of both types of nanopores are measured using HR-TEM . Furthermore, COMSOL is used to model the experimental results. These studies will improve our understanding of solid-state nanopore as a sensor for charged nanoparticle detection.

Santoshi Nandivada
Univ of Arkansas-Fayetteville

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