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Computational model of controlled translocation of DNA molecule through a nanopore membrane with tunable electrostatic potential ALEXEY NIKOLAEV, MARIA GRACHEVA, Clarkson University — We present results of computational modeling of controllable DNA translocation through a nanopore in a thin electrically tunable membrane composed of two layers of n-type and p-type semiconductor materials. Membrane potential biases are used to obtain distinct electrostatic potential landscapes. The membrane-DNA system is immersed in a biased electrolyte solution under bias to induce DNA translocation. A simple charges-and-springs model is used to model polynucleotide molecule. We compare electrostatic potential landscapes of the membrane with one and more potential extrema and show how electrostatic potential landscape in the nanopore alters the control over the molecule translocation. In particular, we specify different conditions under which DNA nucleotides can be translocated through the nanopore one by one in both directions as well as paused in the nanopore.

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