

Abstract Submitted
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Protein separation using an electrically tunable membrane¹ IN-ING JOU, DMITRIY MELNIKOV, MARIA GRACHEVA², Clarkson University — Separation of small proteins by charge with a solid-state porous membrane requires control over the protein's movement. Semiconductor membrane has this ability due to the electrically tunable electric potential profile inside the nanopore. In this work we investigate the possibility to separate the solution of two similar sized proteins by charge. As an example, we consider two small globular proteins abundant in humans: insulin (negatively charged) and ubiquitin (neutral). We find that the localized electric field inside the pore either attracts or repels the charged protein to or from the pore wall which affects the delay time before a successful translocation of the protein through the nanopore. However, the motion of the uncharged ubiquitin is unaffected. The difference in the delay time (and hence the separation) can be further increased by the application of the electrolyte bias which induces an electroosmotic flow in the pore.

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