Controlling molecular transport through nanopores

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Nanopores are emerging as powerful tools for the detection and identification of macromolecules in aqueous solution. Here, we discuss the recent development of active and passive controls over molecular transport through nanopores with emphasis on biosensing applications. We give an overview of the solutions developed to enhance the sensitivity and specificity of the resistive-pulse technique based nanopores. We will also summarize our recent developments of hybrid nanopores based on biological as well as DNA origami nanopores. The latter offer control at the molecular level. DNA origami nanopores are ideally suited for the creation of sensors with tunable diameter as well as more complex functions like voltage gating.