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## Nanofabrication strategies for influencing biomolecule behavior

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In recent years, nanofabrication techniques have shown themselves to have the most promising potential for innovative research on crucial biomolecules for life sciences, such as DNA and RNA. Two main examples are: Firstly, large-scale nanostructuring, effective for engineering innovative biosensors; and secondly, nanopores, intensively exploited for developing fast and inexpensive technologies for DNA sequencing, a major research challenge in the field of biomedicine. In addition to nanopores, nanoslits and nanochannels allow interesting functionalities for the study, processing and sorting of DNA. For example, when a long DNA chain is forced to enter a nanochannel, it stretches, thus acquiring a conformation which allows its genetic information to be optically read. Herein, we have focused on various geometry-based strategies, involving short and long channels, as well as funnels and a series of pit nanostructures, integrated into polymeric lab-on-a-chip models. We have implemented these miniaturized systems in order to study, at single molecule level, the typical conformations of DNA chains in various nano-confinement conditions whilst also observing the dynamic behavior of the long strands in crossing structures with different cross sections. In fact, by taking advantage of polydimethylsiloxane's elasticity, we have developed a strategy for modulating the translocation dynamics of single molecules crossing a nanochannel. Lastly, we have investigated on important applications for life and material sciences of the recent innovative tool which counts and recognizes nanoparticles through a new simultaneous optical and electrical sensing method.

### Biography

P Guida graduated from the University of Genoa in 2003 with a thesis on Biophysics and Dysfunctioning of CLC-channels. In 2008, at the same university, she obtained her PhD in Neurochemistry and Neurobiology (Molecular and Clinical Experimental Biology and Medicine); her thesis being on NMDARs Pathological Modulations. Her working career began in 2002 at the IBF-CNR-Genoa, remaining there until 2007. Since May 2009, she has been a Post-doctoral Researcher at the university's physics department responsible for developing biomimetic platforms for cancer cells, tissue engineering and nanostructures for diagnostic applications. She is co-author of several papers published in numerous international journals.

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