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Polymeric nanochannels for studing DNA and for counting natural and engineered nanoparticles

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Single and multiple nanochannels' devices are powerful tools whose exploitation covers various field of application. Slightly modifying the characteristics of a basic structure like a nanochannel, it is possible to investigate a variety of different phenomena: conformational change in biopolymers, nanoparticles' translocation processes. For example: devices with multiple nanochannels can be used for stretching long DNA moleucles for bar coding applications [1-2], while nanochannels interrupted by series of deep regions can be used as entropic traps for studying the dynamics conformational changes in biopolymers [3]. Devices with short single channels are used for counting and sizing nanoparticles one-by-one exploting an electro-optical tracking method recently developed by our laboratory. This technique is based on the simultaneous acquisition of electrical traces and optical tracks of nanoparticles crossing the nanochannel. This multimodal analysis approach greatly increases the reliability of these sensors, compared to conventional monomodal approaches, in counting and sizing nanoparticles of different nature. The versatility of these nanodevices makes them very valuable tools for several areas of Nanotechnology.

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3. E. Angeli et al., Lab on chip 11, 2625 (2011)
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Biography

Elena ANGELI received her PhD in Physics from the University of Modena and Reggio Emilia, then she moved to the University of Genova where she started working on Nanofluidics for Biomedical applications, at Nanomed Labs. She has been developing innovative technologies and nanofluidic devices, mainly polymeric, for manipulating DNA molecules at single molecule level. Besides her activity on nanofluidic lab-on-chips, she is also exploring the field of polymeric devices for culturing and handling cells of oncological interest.

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