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Self-trapping and stretching of DNA using single nano-height micropillar PO-KENG LIN, Department of Physics, National Taiwan University, Taipei, Taiwan, CHI-CHENG FU, Institute of Atomic and Molecular Science, Academia Sinica, Taipei, Taiwan, Y.-L. CHEN, Institute of physics and Applied Sciences, Academia Sinica, Taipei, Taiwan, W. S. FANN, Institute of Atomic and Molecular Science, Academia Sinica, Taipei, Taiwan — We propose a novel method to trapping ds-DNA molecules in 30-100nm slit-like nanochannel with single micropillar. In this environment the DNA molecules unusually extend around obstacles such as pillars or walls. The DNA molecules appear to have quasi-one dimensional dynamics even though the confinement is quasi-two dimensional. The trapping process can occur only when the channel height below the Kuhn length of ds-DNA. We experimentally observe the Brownian motions of the DNA using wide-field fluorescence microscopy. The static and dynamic scaling with DNA length (9.4∼166 kbps) and channel height (30∼240nm) have been analyzed and compared with the experimental results of DNA confined in the square nanochannels in the literatures (W. Reisner et al., Phys. Rev. Lett. 94 196101 (2005)). This micro/nano fluidic device can be applied to study the multi-step biochemical reactions in confinements such as DNA folding induced by protein and restriction mapping of DNA in the future.

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