Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

From stripe to slab confinement for DNA linearization in nanochannels[1] PETER CIFRA, ZUZANA BENKOVA, PAVOL NAMER, Polymer Institute, Slovak Academy of Sciences, Bratislava, Slovakia — We investigate suggested advantageous analysis in the linearization experiments with macromolecules confined in a stripe-like channel using Monte Carlo simulations. The enhanced chain extension in a stripe that is due to significant excluded volume interactions between monomers in two dimensions weakens on transition to experimentally feasible slit-like channel. Based on the chain extension-confinement strength dependence and the structure factor behavior for the chain in stripe we infer the excluded volume regime typical for two-dimensional systems. On transition to the slab geometry, the advantageous chain extension decreases and the Gaussian regime is observed for not very long semiflexible chains. The evidence for pseudo-ideality in confined chains is based on indicators such as the extension curves, variation of the extension with the persistence length or the structure factor. The slab behavior is observed when the stripe (originally of monomer thickness) reaches the thickness larger than cca 10nm in the third dimension. This maximum height of the slab to retain the advantage of the stripe is very low and this have implication for DNA linearization experiments. The presented analysis, however, has a broader relevance for confined polymers.

[1]Support from Slovak RD Agency (SRDA-0451-11) is acknowledged.

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Date submitted: 05 Nov 2015 Electronic form version 1.4