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Conformational transitions of plasmid ds-DNA on ultrathin films of alkylamines on graphite CAROLINE FALK, HUA LIANG, NIKOLAI SEVERIN, WEI ZHUANG, Department of Physics & IRIS Adlershof, Humboldt-Universität zu Berlin, STEFAN ZAUSCHER, Mechanical Engineering and Materials Science, Duke University, JÜRGEN P. RABE, Department of Physics & IRIS Adlershof, Humboldt-Universität zu Berlin — DNA replication is an important process in the human body. Replication of double-stranded (ds)-DNA requires its local melting into two single strands [1]. DNA, when stretched in solution, overwinds and melts [2]. This was argued to give insight onto the replication mechanism. It is difficult, however, to access the direct conformational changes during stretching in solution. Recent work demonstrated that this transition can be imaged with scanning force microscopy on a graphite surface that is coated with an alkylamine layer [3]. ds-DNA can be controlled by an amphiphilic layer, since the DNA conformation depends on the amphiphile concentration. In particular we analyzed different DNA lengths on the same surface, and we found that at a specific concentration of octadecylamine the ds-DNA pUC19 plasmid ring splits into two single strands at one position. We will discuss methods to mark the DNA to determine the exact location at which the plasmid ring splits.

[1] D. Coman, I.M. Russu, J. Biol. Chem. 280 (2005) 20216.
[2] J. Adamcik, S. Tobenas, G. Di Santo, D. Klinov, G. Dietler, Langmuir 25 (2009) 3159.
[3] H. Liang, N. Severin, W. Zhuang, J.P. Rabe, Control of plasmid DNA Conformations on Molecularly Modified Graphene Surfaces (submitted).

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