Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Morphology And Local Mechanical Properties Of A Block Copolymer Cell Substrate CRAIG WALL, IVAN YERMOLENKO, NT-MDT Development Inc., G. RAJESH KRISHNAN, DEBANJAN SARKAR, Department of Biomedical Engineering, University at Buffalo, JOHN ALEXANDER, NT-MDT Development Inc. — Atomic force microscopy (AFM) was applied for the characterization of morphology and mechanical properties of a block copolymer coating designed for biomaterials applications. The material is a block-copolymer with poly(ethylene glycol) as one block and a peptide as second block, which are connected through urethane bonds. The AFM images obtained in amplitude modulation mode revealed the morphology is characterized by micron-scale sheaf-like structures embedded in a more homogeneous and, presumably, amorphous matrix. The self-assembly of the peptide segments is responsible for the formation of the ordered sheaf structures and this phenomenon was common for different variations of the components. Maps of elastic modulus and work of adhesion of the block copolymer, which also differentiate the matrix and ordered regions, were obtained with Hybrid mode at different tip-force levels. The quantitative estimates show that elastic modulus varies in the MPa range and work of adhesion in the hundreds of mJ/m^2 range. These data are compared with AFM-based nanoindentation that was performed at higher tip-force level. The results indicate that material surface is more complicated and they suggest in-depth morphology variations. A tentative model of the structural organization is proposed.

John Alexander
NT-MDT Development Inc.

Date submitted: 15 Nov 2013 Electronic form version 1.4