Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Diblock Copolymer as a Surface Delivery Vehicle for DNA Chip Construction LU CHEN, CHRIS GRIGORAS, JEFFREY KOBERSTEIN, MONG MARMA, ZENGMIN LI, JINGYUE JU — A generic DNA sensor is made of a substrate, a coupling layer built on the substrate and the DNA attached to the coupling layer. Previously a DNA chip was constructed using a small molecule bi-functional linker via 1,3-dipolar zaide-alkyne cycloaddition coupling chemistry. The reaction efficiency of the cycloaddition coupling chemistry is high but there are some disadvantages such as low DNA coverage and low mobility of DNA due to the use of the small molecule linker. In this paper, a newly synthesized asymmetric diblock copolymer poly(methyl methacrylate-b-tert butyl acrylate) [poly(MMA-b-tBA)] with alkyne functional groups at the end of tBA block will be used as the coupling layer for the DNA chip construction. As will be shown in this paper, the attached DNA will have more mobility and higher surface coverage because of the use of the alkyne-end functionalized diblock copolymer as the coupling layer. More importantly, the areal density of the DNA molecules can be tuned by the thickness of the film simply made by the spin-coating method. The copolymer thin film was characterized by angle-dependent X-ray photoelectron spectroscopy, ellipsometry measurement and contact angle measurement. The thickness of tBA block was estimated using the substrate-overlayer model of ADXPS. The dye-labeled DNA chemically bonded to the surface was characterized by fluorescence measurement.

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Date submitted: 20 Nov 2006 Electronic form version 1.4