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Stretching DNA molecules on a flexible substrate, a polarization-dependent fluorescence microscopy study KE ZHU, Stony Brook University, Stony Brook, NY, JOHN MELE, Central Islip Senior High School, Central Islip, NY, JULIA BUDASSI, JONATHON SOKOLOV, Stony Brook University, Stony Brook, NY — DNA molecules absorbed and stretched onto surfaces can be used to analyze DNA structure by imaging fluorescence of labeled hybridization probes or enzymes. A recently proposed method for sequencing by electron microscopy requires either adsorbed single-stranded DNAs or untwisted double-stranded DNA. In this experiment, studies were performed on the adsorption of isolated DNA molecules to a flexible PDMS substrate, which permits continuous stretching, until breakage of the DNA molecules. Lambda and T4 DNAs (48.5 and 165.6 kilobase pairs, respectively) were absorbed onto PDMS out of solution by withdrawing a submerged substrate at a rate of 2mm/s, producing linear molecules deposited on the surface. Incident light polarization was varied and fluorescence emission intensity measured as a function of polarization angle and degree of stretching of the DNA. The stretching and breakage properties of lambda and T-4 DNA on the PDMS substrate were determined. The amount of stretching before breakage occurred was found to be up to 40% relative to the as-deposited length. Supported by NSF-DMR MRSEC program.

Ke Zhu
Stony Brook University, Stony Brook, NY

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