

## Migration and deposition of PLL-g-PEG molecules along AFM probe tips

Sequencing of the human genome involves the separation and detection of short DNA fragments using e.g. capillary gel electrophoresis. Recent development at IBM provides a nanotechnology based approach enabling the separation of DNA fragments down to the single molecule level orders of magnitude faster than conventional techniques: The electrophoretic medium for the analysis is the nanometers thin water layer on the surface of an AFM probe covered by a monolayer of poly(ethylene glycol) (PEG). A potential is applied between the back surface of an AFM cantilever and a substrate resulting in a homogenous electric field driving negatively charged DNA chains up and down on the surface of the AFM tip (Figure 1). In this novel configuration, DNA fragments show electrophoretic mobilities dependent on their size and are sorted while moving along the tip surface (See Figure 2).

The aim of this project is to replace the current immobile PEG layer with a monolayer of poly(L lysine) (PLL) grafted PEG which is attached to the AFM tip via the positively charged PLL backbone and as such is expected to be mobile migrating to the opposite direction as the DNA. A library of PLL-g-PEG molecules will be tested to tailor the density of the PEG chains on the tip in order to change the migration speed of the different DNA fragments.

Supervisor at IBT, ETHZ: Prof. Janos Vörös

Supervisor at University of Irvine, CA: Professor H. Kumar Wickramasinghe

Place of Project: University of Irvine, CA (only for diploma or masters students)

Please apply as soon as possible in order to leave enough time for the Visa process!

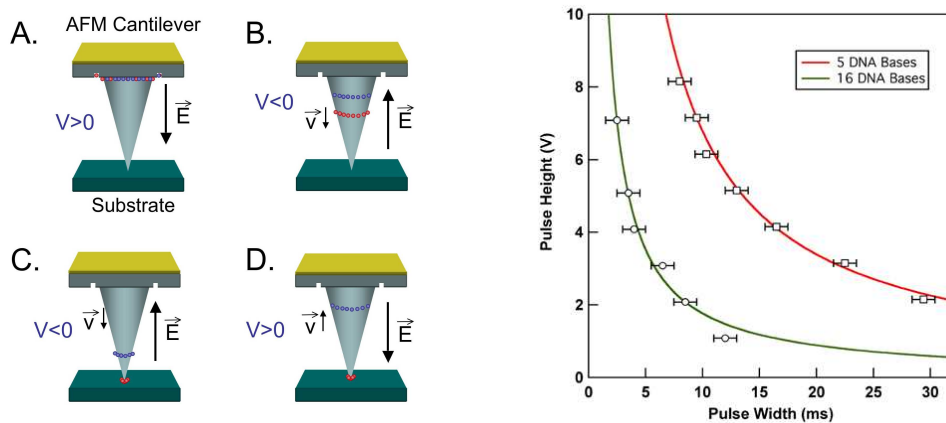


Figure 1 (left) Electrophoretic molecular sorting on AFM tip surface. (A) collection, (B) sorting and (C) deposition of molecules. The remaining molecules are re-collected using an inverse electric field.

Figure 2. (right) electrophoretic mobility measurements for 5 and 16 bases long DNA fragments.