Electronic Supplementary Material (ESI) for Analyst.

Supplementary information

Reaching for the limits in continuous-flow dielectrophoretic DNA separation

Sarah Täuber, Lena Kunze, Oleg Grauberger, Armin Grundmann, and Martina Viefhues*

Experimental Biophysics and Applied Nanoscience, Faculty of Physics, Bielefeld University, 33615 Bielefeld, Germany. Fax: +49 (0) 521 106 2959; Tel: +49 (0)521 106 5388;

E-mail: viefhues@physik.uni-bielefeld.de

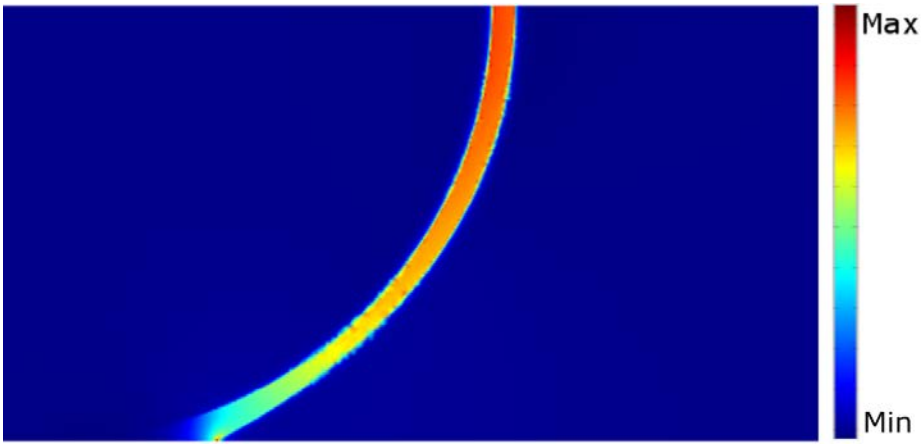

Figure SI1: Simulation of electric field in the vicinity of the nanoslit (top view). The strength of the electric field is colour-coded. The electric field cannot pass the insulating ridge, and thus the electric field is increased in the nanoslit. The largest gradient in the electric field is observed at the corner of the ridge. For instance, objects exhibiting positive DEP, like DNA, are trapped in the nanoslit.

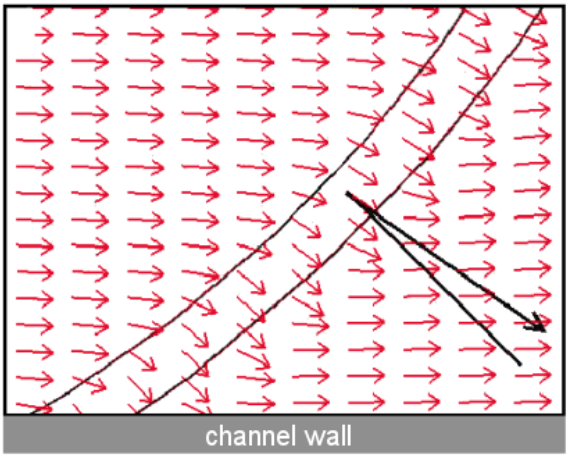

Figure SI2: Electric field in the vicinity of the nanoslit (top view). The red arrows indicate the direction of the electric field. A close-up look of the electric field in the nanoslit reveals that the electric field has a component tangential to the ridge (black arrow). Thus, DNA, once trapped dielectrophoretically in the nanoslit, is driven by electrophoretic forces towards the opposite channel wall.

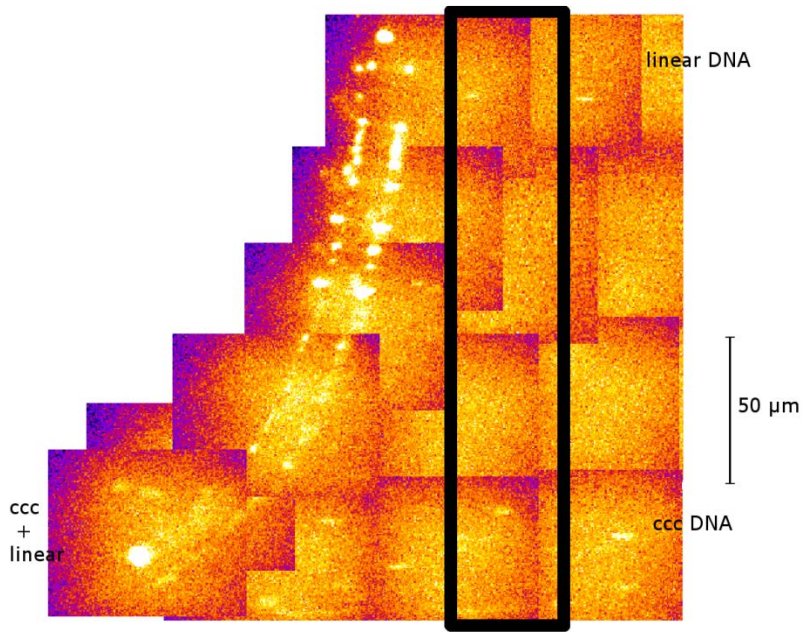

Figure SI3: Separation of linear and ccc DNA, with deflection of the linear DNA. Collage of the fluorescence microscopy images of the separation with the scan region for the fluorescence intensities marked.

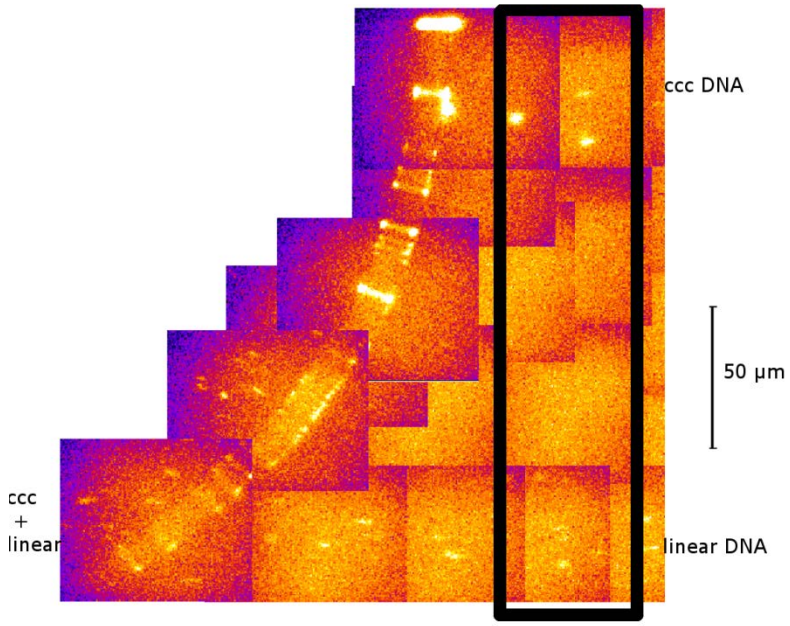

Figure SI4: Separation of linear and ccc DNA, with deflection of the ccc DNA. Collage of the fluorescence microscopy images of the separation with the scan region for the fluorescence intensities marked.

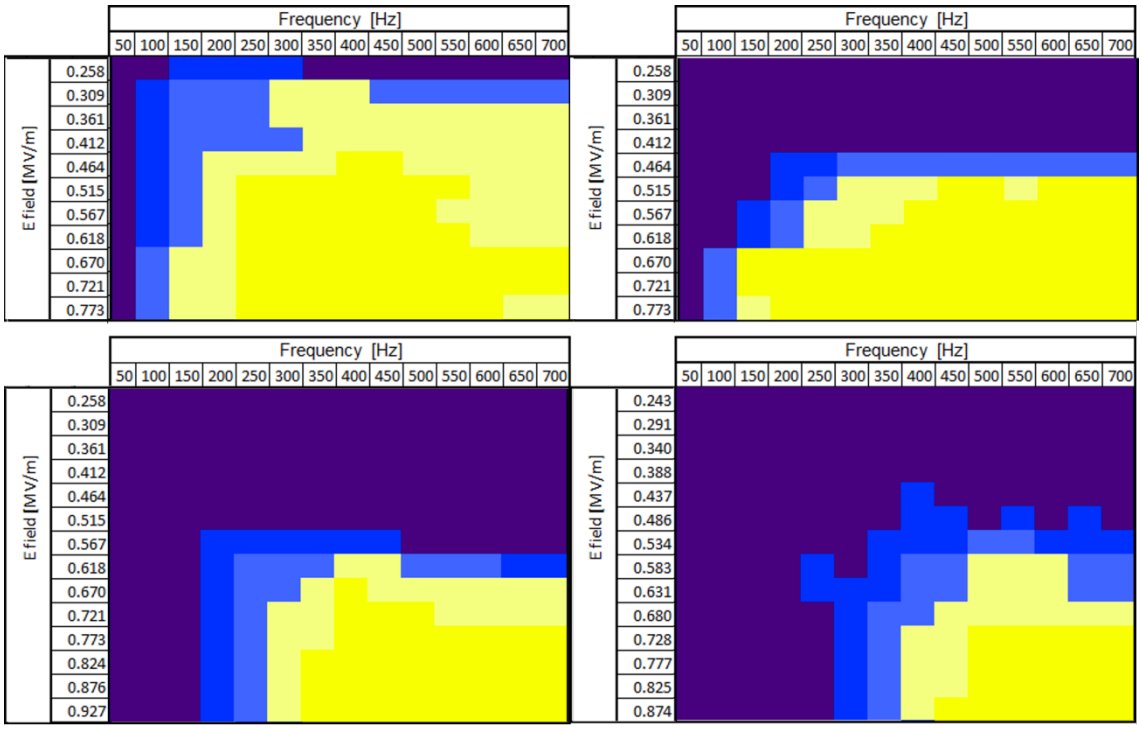

Figure SI5: Dielectrophoretic migration profiles of 10.0 kbp, 8.0 kbp, 6.0 kbp, and 5.0 kbp linear DNA. The ac voltage settings were varied and the DEP migration behavior along the ridge was analyzed. Purple: no trapping, dark blue: trapping of few molecules without full deflection along the ridge, light blue: full deflection of up to 50% of the sample, light yellow: deflection of 95% of the sample, dark yellow: complete deflection of the sample, thus 100%.

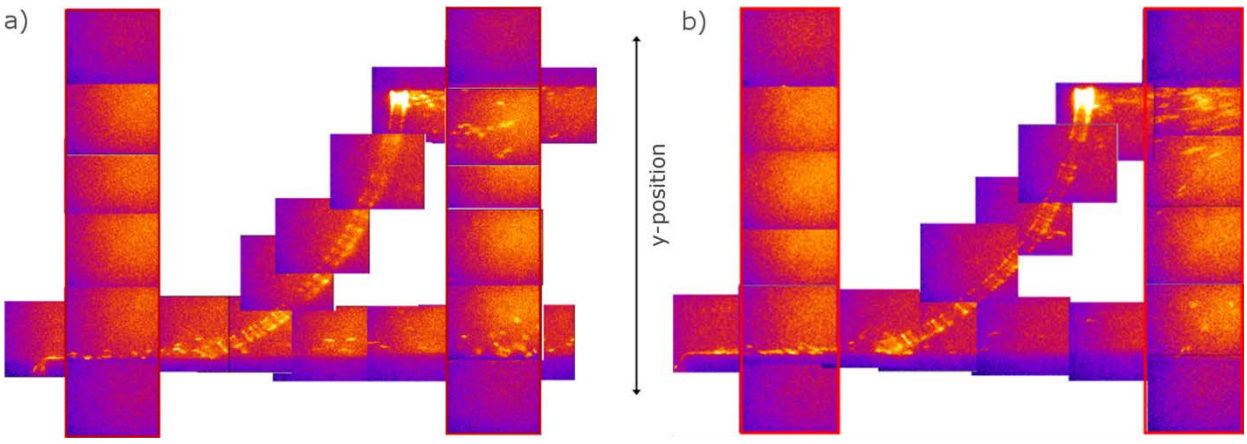

Figure SI6: Collage of fluorescence microscopy images for a separation of 6.0 kbp and 5.0 kbp DNA. a) Separation of 6.0 kbp and 5.0 kbp DNA. The 6.0 kbp was deflected at the ridge, while the 5.0 kbp passed the ridge unaffected. b) Deflection of 6.0 kbp DNA in the same device and at the same parameter as in a).