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Channeling of DNA during Electrophoresis in a Sparse Ordered Post Array JIA OU, JASEOL CHO, SAM CARPENTER, DAN OLSON, KEVIN DORFMAN, Dept. of Chemical Engineering and Materials Science, University of Minnesota — Microfabricated post arrays are a promising approach to separate long DNA by size. Simulation data suggest that, if the post array is ordered and sparse, then long DNA will move through the array with very few collisions and the separation will be lost. We tested this "channeling hypothesis" using 1 μm diameter post arrays with two different pitches: 3 μm and 7 μm. The mobility, dispersivity and videomicroscopy data for λ-DNA in a 3μm pitch array indicate that the DNA frequently collide with the posts over a wide range of electric fields. We demonstrate via simulations that the frequent collisions are due to the curved electric field lines. To detect the onset of channeling in the 7μm pitch array, which has a more uniform field, we compared the electrophoretic mobility of λ-DNA and a smaller plasmid, pUC19 (2,383 bp), that cannot make a rope-over-pulley collision. At low electric fields, these DNA are separated because the λ-DNA collides with the posts. The resolution is lost as the electric field increases due to the onset of channeling by the λ-DNA.

Jia Ou
Dept. of Chemical Engineering and Materials Science,
University of Minnesota

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