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Using Measurements of Mobility, Diffusion, and Dispersion to Predict Separation Resolution in DNA Electrophoresis ROGER LO, VICTOR UGAZ, Texas A&M University — Electrophoresis of DNA continues to be a key component in a wide variety of genomic analysis assays. In order to customize and optimize these assay systems, much effort has been directed to improve and predict separation resolution using various sieving matrices and experimental platforms. Predicting separation resolution requires a much more detailed understanding of mobility, diffusion, and dispersion phenomena of DNA fragments migrating in the sieving matrix than is currently available in literature. In this study, we address this issue by obtaining a series of systematic measurements of mobility, diffusion, and dispersion using an automated DNA sequencer. Using this data, we are able to isolate key factors governing separation performance, and make comparisons with biased reptation theory to extract information on gel structure and predict achievable resolution under each set of operating conditions. We are also able to predict the separation resolution under specific run conditions, thereby giving researchers and engineers the ability to easily tailor DNA separation systems for required separation performance.

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