Abstract Submitted
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Dynamics of topological events within single molecules of DNA confined in nanochannels.[1] JEFFREY REIFENBERGER, BioNano Genomics, KEVIN DORFMAN, Dept. Chemical Engineering and Materials Science, University of Minnesota - Twin Cities, HAN CAO, BioNano Genomics — Genome mapping in nanochannels offers the ability to search for large genomic rearrangements within individual molecules of DNA often missed by sequencing techniques. This method labels DNA at specific sequence motifs such as 'GCTCTTC' with a cy3-like fluorophore and then stains the backbone of dsDNA with an intercalating dye. DNA is electrophoretically loaded into an array of nanofluidic channels and linearized in physically confined narrow conduits fabricated on the silicon chip. The fluorescently labeled sequence motifs, unique to long genomic regions, are optically imaged and digitized reflecting structural changes that can occur within cancer. However, some molecules of DNA confined within the ˜42 nm wide nanochannels contain topological structures: knots, S-folds, and end-folds that could appear as false genomic rearrangements. We present a technique in which thousands of molecules of *E. coli* DNA are sequentially imaged in the nanochannels during several minutes allowing for topological events like diffusion of knots, unfolding at the ends, and spontaneous formation of S-folds to be measured. This technology will provide insights and a solution in error correction for making more accurate measurements.

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