Abstract Submitted
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Uncovering the effect of DNA topology on the mobility and conformational dynamics of crowded DNA molecules[1] STEPHANIE GORZCYZA, University of San Diego, COLE E. CHAPMAN, University of California, San Diego, RAE M. ROBERTSON-ANDERSON, University of San Diego — Using single molecule fluorescence microscopy and particle-tracking, we examine the effects of crowding on the diffusion and conformation of large, double-stranded circular DNA molecules. To determine diffusion, we track the mean-squared-displacement of single fluorescent-labeled DNA molecules embedded in solutions of different crowding agents. Using image analysis techniques, we also characterize the conformational change (from random coil configuration) induced in DNA by crowding. Our previous studies with linear DNA crowded by dextran reveal crowding-induced mobility reduction of DNA, dependent on crowder size, and elongation of DNA random coils, dependent on DNA size. Here, we compare our previous results to those for circular DNA crowded by varying crowding agents including dextran, Ficoll and Polyethylene Glycol. We determine the dependence of circular DNA mobility and conformation on the level of crowding, molecular weight of the crowding agent, structure of the crowder, and DNA length (11-115 kilobasepairs). Thus, this research uncovers the underlying mechanisms responsible for observed DNA dynamics in crowded environments and biological cells.

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