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Study of mechanical properties of DNA in E. coli cells by fluorescence correlation spectroscopy RUDRA KAFLE, Worcester Polytechnic Institute, MOLLY LIEBESKIND, JENS-CHRISTIAN MEINERS, University of Michigan — Mechanical quantities like the elasticity of cells are conventionally measured by directly probing them mechanically. Measurements of these quantities for subcellular structures in living cells are almost impossible this way. We use fluorescence correlation spectroscopy (FCS) to measure such mechanical quantities in chromosomal DNA in *E. coli* cells. We present methods to address complexities of live-cell FCS such as photobleaching, and calculate the viscoelastic moduli from the FCS data. We compare the measured viscoelastic moduli of live cells with those that are ATP-depleted to stop all molecular motor action and find substantial differences. Active processes are stopped in ATP-depleted cells and hence the bacterial DNA appears to become stiffer and the surrounding intracellular medium more viscous. We also compare our results with the FCS data obtained from the lambda DNA solution in various concentrations to mimic the cellular environment.

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