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A general method for preparing DNA sequences for optical tweezers manipulation DEREK FULLER, AURELIE DUPONT, PIERRE RECOUVREUX, GREGORY J. GEMMEN, RACHEL MILLIN, DOUGLAS E. SMITH, UCSD — Manipulation of single DNA molecules with nanometer-level position resolution and picoNewton-level force resolution is a powerful technique in the study of protein-DNA interactions. Here we present a general method for efficient preparation of any DNA sequence from any organism for optical tweezers manipulation. We demonstrate this method in preparing genomic DNA sequences from Bacteriophage Lambda, E. Coli, Drosophila, Arabidopsis, and Human sources. End-labeled constructs up to 40 kilobasepairs are generated by PCR and single molecules are tethered to microspheres and manipulated using optical tweezers. DNA attachment kinetics, binding strength, tether length, and elastic properties are characterized. This sample preparation method is applicable to a wide range of biophysical studies.

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