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Ethanol Induced Shortening of DNA in Nanochannels GREG GEMMEN, University of Oregon, WALTER REISNER, McGill University, JONAS TEGENFELDT, HEINER LINKE, Lund University — The confinement of DNA in nanochannels has greatly facilitated the study of DNA polymer physics and holds promise as a powerful tool for genomic sequencing. Ethanol precipitation of DNA is a common tool in molecular biology, typically in >70% [EtOH]. Even at lower ethanol concentrations, however, DNA transforms from B-form to A-form, a shorter yet slightly less twisted conformation. Accordingly, we isolated individual YOYO-1 labeled λ-DNA molecules in 100nm$\times$100nm channels in 0, 20, 40 and 60% [EtOH]. We observed a dramatic shortening in the mean measured lengths with increasing [EtOH] and a broadening of the distribution of measured lengths at the intermediate concentrations. These observed lengths are less than those expected from fully A-form λ-DNA, suggesting that poor solvency effects are involved. Also, substantial spatial variations in intensity in a small number of molecules at the higher [EtOH] suggest the presence of higher order DNA conformations, in accord with the observation that the effective persistence length of DNA has been greatly reduced.

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