Local Conformation of Confined DNA Studied Using Emission Polarization Anisotropy

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Supporting Information

Chip fabrication.

The fabrication scheme used is based on the double thermal oxidation scheme for silicon presented in ref. S1, where the silicon is used as an etch-stop so the height of the channels is defined by the oxidations. Since a hydrofluoric acid etch would widen the nanochannels, the fabrication scheme was modified by etching the nanochannels using an anisotropic reactive ion etch, with a selectivity of approximately 1:10 for Si:SiO₂.

Data analysis

To perform the data analysis for the graph in Figure 3B, a Matlab program was used, with the analysis flow schematically shown in Figure S1. For a given molecule, the intensity transverse to the extension axis was summed to obtain a 1-D intensity scan along the channel axis for every frame in a movie, yielding a time series (see Figure S1A-B). These intensity traces were fitted with a box function convoluted with a Gaussian point-spread function (PSF), to compensate for the resolution of the optical system (Figure S1C). From this fitting procedure we obtained the molecule extension along the nanochannel (r) as well as the
average intensity ($I$), with background subtracted. From the average intensities the polarization ratio was calculated for each pair of frames (one frame from the 0 deg. and 90 deg. movie respectively), giving a value and standard deviation for each movie. This average ratio is plotted against the relative extension ($r/L$) in Figure 3B.

**Figure S1** Schematic showing the data analysis flow. In A a molecule is manually chosen by enclosing it in a rectangular selection. Summing horizontally along this enclosure yields a time trace shown in B, where every column corresponds to one frame in the movie. Every column is then fitted by a box function convoluted with a Gaussian PSF as indicated in C. By this we obtain a value for the molecule extension $r$ and the average intensity for each frame, $I$.

**Movie S1**

The movie supplied as a part of the supporting material shows a DNA molecule in an S-conformation as presented in Figure 2. The emission light polarization that passes through the filter is switched between horizontal and vertical six times during the movie, starting with the vertical polarization. The frame rate corresponds to the recording frame rate.

**References**