

## **Dynamics and Screening in Na-DNA Aqueous Solutions: A Dielectric Spectroscopy Study**

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Dynamics and screening in Na-DNA dilute and semidilute aqueous solutions is characterized by dielectric spectroscopy in the frequency range 100 Hz – 100 MHz. Two relaxation modes are revealed that can be attributed to diffusive motion of DNA counterions. The overall study in the wide concentration, added salt and chain length range demonstrates that the motion detected at lower frequencies probes single-chain structural properties, whereas the one at higher frequencies characterizes the collective properties of the DNA solution composed of many chains. The characteristic length scales and screening found in the measurements compare well with those predicted by theory. Surprisingly, results obtained on 146 bp double-stranded DNA indicate that these short DNA fragments exhibit much higher flexibility than expected from the conventional worm-like chain model. Our results are in accord with those obtained in similar studies using small-angle X-ray scattering and fluorescence resonance energy transfer. At the end, open issues and prospects for further research of other biopolymers are designated.