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Competition and spatial distribution of ions diffusively bound to DNA KURT ANDRESEN, School of Applied and Engineering Physics, Cornell Univ., RHIJU DAS, Departments of Physics and Biochemistry, Stanford Univ., HYE YOON PARK, School of Applied and Engineering Physics, Cornell Univ., HEATHER SMITH, Department of Physics, Cornell Univ., LISA KWOK, JESSICA S. LAMB, EARL KIRKLAND, School of Applied and Engineering Physics, Cornell University, DANIEL J. HERSCHLAG, Departments of Biochemistry and Chemistry, Stanford Univ., KENNETH D. FINKELSTEIN, Cornell High Energy Synchrotron Source (CHESS), Cornell University, LOIS POLLACK, School of Applied and Engineering Physics, Cornell Univ. — Anomalous small angle x-ray scattering (ASAXS) has been employed to study the spatial distribution of diffusively bound counterions around DNA. Solutions containing pure monovalent and pure divalent cations have been examined. Measurements probing the competition of monovalent and divalent ions will also be reported and allow for further tests of basic predictions of current electrostatic models, such as the insensitivity of the normalized ion distribution to the competitive environment. In addition, measurements of competitive binding allow determination of a critical surface concentration parameter. Comparison of the competition data to the Poisson-Boltzmann (PB) model suggests that ion size effects are important when modeling ion atmospheres around polyelectrolytes such as nucleic acids using mean field theories.

Kurt Andresen
School of Applied and Engineering Physics, Cornell University

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