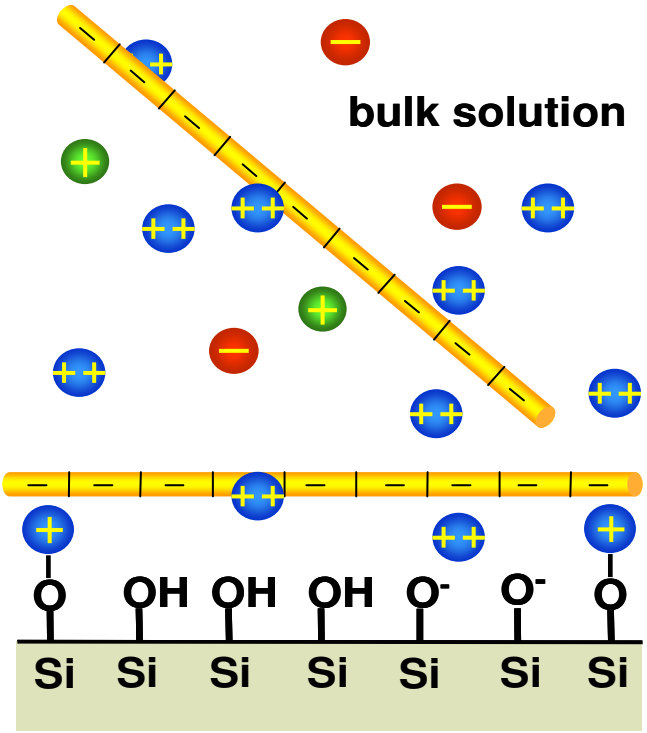
Polynucleotide Adsorption to Negatively Charged Surfaces

H. Cheng, K. Zhang, J. A. Libera, M. Olvera de la Cruz, M. J. Bedzyk; "Polynucleotide Adsorption to Negatively Charged Surfaces in Divalent Salt Solutions," *Biophysical Journal* 90, 1164-1174 (2006). J. A. Libera, H. Cheng, M. Olvera de la Cruz and M. J. Bedzyk **"**Direct Observation of Cations and Polynucleotides Explains Polyion Adsorption to Like-Charged Surfaces**"** *J. Phys. Chem. B* 109 23001-23007 (2005).

Polynucleotide adsorption to negatively charged surfaces via divalent ions is extensively used in the study of biological systems. The adsorption mechanism is analyzed via a self-consistent mean field model that includes the pH effect on the surface charge density and the interactions between divalent ions and surface groups. The adsorption is driven by the cooperative effect of divalent metal ion condensation along polynucleotides and their reaction with the surface groups. Long-period X-ray standing waves are used to study the adsorption of mercurated-polyuridylic acid (Hg-poly(U)) in a $ZnCl_2$ aqueous solution onto a negatively charged hydroxyl-terminated silica surface. These in situ x-ray measurements, which simultaneously revealed the Hg and Zn distribution profiles along the surface normal direction, are in good agreement with our model. The disclosed mechanism is important for finding methods to control the polynucleotide density or conformation on surfaces.



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