

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

A simple electrostatic model applicable to biomolecular recognition¹ T. P. DOERR, YI-KUO YU, NIH/NLM/NCBI — An exact solution is presented for a model consisting of a layer of high dielectric constant material (*e.g.*, water) of varying thickness separating two regions of low dielectric constant material (*e.g.*, DNA, RNA, protein) in each of which is embedded a point charge. While the presence of the screening layer always lowers the energy for identical charges compared to the case of an infinite medium of low dielectric constant, the presence of a sufficiently thick screening layer also lowers the energy compared to the case of an infinite medium of *high* dielectric constant. The behavior of the energy leads to a substantially increased repulsive force. For charges of opposite sign, the screening layer always lowers the energy compared to the case of an infinite medium of either high or low dielectric constant. The attractive force in this case is weaker than in an infinite medium of low dielectric constant material but stronger than in an infinite medium of high dielectric constant material. The presence of this behavior, which we name asymmetric screening, in the simple system presented here confirms the generality of the behavior that was established in a more complicated system of an arbitrary number of charged dielectric spheres in an infinite solvent.

¹This research was supported by the Intramural Research Program of the NIH, National Library of Medicine.

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Date submitted: 20 Nov 2009

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