Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

A theoretical study of colloidal forces near an amphiphilic polymer brush JIANZHONG WU, University of California, Riverside — Polymer-based "non-stick" coatings are promising as the next generation of effective, environmentally-friendly marine antifouling systems that minimize nonspecific adsorption of extracellular polymeric substances (EPS). However, design and development of such systems are impeded by the poor knowledge of polymer-mediated interactions of biomacromolecules with the protected substrate. In this work, a polymer density functional theory (DFT) is used to predict the potential of mean force between spherical biomacromolecules and amphiphilic copolymer brushes within a coarse-grained model that captures essential nonspecific interactions such as the molecular excluded volume effects and the hydrophobic energies. The relevance of theoretical results for practical control of the EPS adsorption is discussed in terms of the efficiency of different brush configurations to prevent biofouling. It is shown that the most effective antifouling surface may be accomplished by using amphiphilic brushes with a long hydrophilic backbone and a hydrophobic end at moderate grafting density.

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Date submitted: 28 Sep 2010 Electronic form version 1.4