



Dept. Materials and Interfaces  
Prof. Samuel A. Safran

November 24, 2003

Biocomplexity Faculty  
Search Committee  
c/o Prof. Rob de Ruyter van Steveninck  
Biocomplexity Institute, Indiana University  
Swain Hall West 117,  
Bloomington, IN 47405-7105

Dear Professor Steveninck,

I am happy to write with a recommendation for Dr. Andy Lau who is applying for a faculty position. I know Andy from our collaboration on fluctuation effects on electrostatics of soft matter during the time he was a Ph.D. student in the group of Prof. Phil Pincus at UCSB. Andy made two trips to Israel and met with me when I visited UCSB during that time.

Andy was an unusually productive and capable graduate student. He worked on problems that were both significant (e.g., the work with Pincus, published in PRL on the effect of electrostatics fluctuations in reducing the bending rigidity of vesicles and thereby allowing spontaneous vesicle formation) and technically difficult (the work with Levine on the fluctuation modes of Wigner crystals and how these modes relate to the fluctuations in the liquid phase of the charges and counterions). The more recent work we did together on counterion condensation (published in PRE) is important since it predicts that the valence of the counterion plays a crucial role in determining the spatial extent of the counterion cloud around a charged surface in aqueous solution. It is well known experimentally that divalent counterions cause condensation of DNA – that is, they generate an effective attraction between similarly charged DNA molecules. This attraction comes from the correlations of the oppositely charged counterions and co-ions in the system; the simple, Poisson Boltzmann treatment neglects these correlations and predicts only repulsive interactions. Andy's prediction of counterion condensation (that required quite a bit of theoretical creativity) may be telling us why the valence is crucial in generating the condensation or bundling of DNA since he predicts that the valence governs a phase transition in the spatial extent of the condensed counterions. This is in contrast to previous work where the valence merely increased the magnitude of the correlation induced attractions.

During his postdoc at the University of Pennsylvania, Andy has worked on a variety of problems related to the interactions of rigid or semi-rigid, rod like molecules. This study has resulted in a significant number of publications in excellent journals and demonstrates his ability to work on areas different from his Ph.D. research. He has also been interested in using his background in soft matter science to treat materials of interest to biology. In addition to his ability to define and solve important and technically difficult theoretical problems, Andy is very interactive and highly articulate and would contribute very positively to the general scientific life of your department. I recommend him as a candidate who merits very serious consideration.

Yours truly,

Samuel Safran

