

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Extreme deformation of vesicle membrane under DC electric fields MOHAMED SADIK, JERRY W. SHAN, DAVID I. SHREIBER, HAO LIN, Rutgers University — Electrodeformation refers to the deformation of cell or vesicle lipid membranes under the application of an electric field. This phenomenon often accompanies electroporation, an important technique to introduce molecules into the cells *via* electric-field-induced membrane permeabilization. On the other hand, it can be also harnessed to probe the mechanical and dynamic properties of the lipid membranes. Recent studies suggest that the electrical conductivity difference across the membrane is a dominant factor in determining the regimes of deformation. In this work, the deformation of vesicular cellular mimics is systematically investigated, in particular with respect to varying electric field strengths, and a wide range of conductivity ratios. The results reveal that, under moderate values of the conductivity ratio, the membranes exhibited moderate deformations, in agreement with previous reports in the literature. Furthermore, under high conductivity ratios (~ 100), the vesicle membranes exhibited atypical, extreme elongations previous not reported. This phenomenon suggests a new regime of membrane electrodeformation which awaits further study. The current work also attempts to establish the correlation between the extreme deformation and membrane permeabilization (electroporation).

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Date submitted: 04 Aug 2008

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