Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Applied Electric Fields and the Aggregation of Highly Charged Proteins LOUIS NEMZER, BRET FLANDERS, CHRISTOPHER SORENSEN, Kansas State University — The abnormal aggregation of misfolded proteins is associated with the onset of Alzheimer's disease, along with other neurodegenerative disorders, and there is increasing evidence that prefibrillar clusters, rather than fully-formed amyloid plaques, are primarily responsible. Therefore, weakly invasive methods, such as dynamic light scattering, which can probe the size distribution and structure factor of early nuclei and proto-aggregate clusters, can serve an important role in understanding this process, and may lead to insights regarding future therapeutic interventions. Here we study a highly charged model protein, lysozyme, under the influence of applied AC and DC fields in an effort to evaluate general models of protein aggregation, including the coarse-grained "patchy protein" method of visualizing charge heterogeneity. This anisotropy in the interprotein interaction can lead to frustrated crystalline order, resulting in low density phases. Dynamic measurements of the size distribution and structure factor can reveal local ordering, hierarchical clustering, and fractal properties of the aggregates. Early results show that applied fields affect early cluster growth by modulating local protein and counterion concentrations, in addition to their influence on protein alignment.

Louis Nemzer
Kansas State University

Date submitted: 18 Nov 2010 Electronic form version 1.4