Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Porescale transport phenomena in charge-selective hemofilters[1]
SUBHRA DATTA, ALBERT CONLISK, The Ohio State University — Theoretical models for hindered transport of biomolecules and electrostatic and electrokinetic phenomena in the pressure driven flow of blood simulants in structured nanoporous membranes are developed, motivated by the design requirements for a hemofilter for an implantable artificial kidney. In particular, the selectivity of charged membrane to charged biomolecules of biological interest, the inference of the pore wall surface charge density from streaming potential measurements, when electrical double layers overlap and the pore wall surface charge density is heterogeneous (e.g. due to nonuniformities in the applied surface coatings) and the coupling of intrapore phenomena with mass transfer and fluid flow upstream and downstream of the membrane are discussed. The developed theory is applied to the problem of choosing a hemofilter pore size that provides adequate retention/clearance of desirable/undesirable solutes from blood.

[1]Support from the National Institute of Biomedical Imaging and Bioengineering through NIH Grant Number R01EB008049 is acknowledged.

Subhra Datta
The Ohio State University

Date submitted: 11 Aug 2009 Electronic form version 1.4