1084-35-36 **Keith S Promislow*** (kpromisl@math.msu.edu), Dept. of Mathematics, Michigan State University, Okemos, MI 48864. *Competitive instabilities in Network Morphologies.*

A fundamental goal of polymer chemistry is to produce network structures of desired morphology. Typically the optimal structures occur at the smallest possible length scales, 5-50 angstroms, at which molecules can assemble, so as to maximize the surface area available for chemistry, and to maximize selective transport. At these length-scales solvent-ion interactions are dominant and ionic entropy, solvation shells and excluded volume effects must be accounted for. We present a reformulation of the Cahn-Hilliard energy, the Functionalized Cahn-Hilliard (FCH) energy, which dramatically extends its applicability. We show that the minimizers of the FCH correspond to the bilayer, pore, and micelle structures that are ubiquitous in these systems, moreover we investigate the competition between these structures that leads to the selection of stable morphologies. (Received August 11, 2012)