Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Rheology of Coarsening Foam[1] ANDREW KRAYNIK, Sandia National Laboratories, SASCHA HILGENFELDT, Northwestern University, DOUGLAS REINELT, Southern Methodist University — Gas diffusion between bubbles causes soap froth to coarsen and soften because the modulus scales with inverse bubble diameter and also decreases as foam polydispersity increases. Computer simulations with the Surface Evolver are used to elucidate the rheology and evolution of 3D foam structure during diffusive coarsening. The instantaneous cell growth rates are evaluated directly from the foam microstructure because the counterpart of von Neumann's law, which provides an exact relationship between growth rate and topology in 2D, is unavailable in 3D. Two mechanisms are responsible for foam topology changes: cell-neighbor switching triggered by cell edges shrinking to zero length (T1) and small cells disappearing (T2). We will discuss the topological, geometric and growth-rate statistics of the foam and individual cells as the system evolves toward what is presumed to be a scaling state.

[1]Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energys National Nuclear Security Administration under contract DE-AC04-94AL85000.

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Date submitted: 01 Sep 2005

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