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Border-Crossing Model for the Diffusive Coarsening of Wet Foams DOUGLAS DURIAN, CODY SCHIMMING, University of Pennsylvania — For dry foams, the transport of gas from small high-pressure bubbles to large low-pressure bubbles is dominated by diffusion across the thin soap films separating neighboring bubbles. For wetter foams, the film areas become smaller as the Plateau borders and vertices inflate with liquid. So-called "border-blocking" models can explain some features of wet-foam coarsening based on the presumption that the inflated borders totally block the gas flux; however, this approximation dramatically fails in the wet/unjamming limit where the bubbles become close-packed spheres. Here, we account for the ever-present border-crossing flux by a new length scale defined by the average gradient of gas concentration inside the borders. We argue that it is proportional to the geometric average of film and border thicknesses, and we verify this scaling and the numerical prefactor by numerical solution of the diffusion equation. Then we show how the $dA/dt = K_0(n-6)$ von Neumann law is modified by the appearance of terms that depend on bubble size and shape as well as the concentration gradient length scale. Finally, we use the modified von Neumann law to compute the growth rate of the average bubble, which is not constant.

Douglas Durian
Univ of Pennsylvania

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