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Similarity between humans and foams in aging dynamics BYUNG MOOK WEON[1], School of Advanced Materials Science and Engineering, SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University, PETER S. STEWART[2], School of Mathematics and Statistics, University of Glasgow — Foams are cellular networks between two immiscible phases. Foams are initially unstable and finally evolve toward a state of lower energy through sequential coalescences of bubbles. In physics, foams are model systems for materials that minimize surface energy. We study coalescence dynamics of clean foams using numerical simulations with a network model. Initial clean foams consist of equally pressurized bubbles and a low fraction of liquid films without stabilizing agents. Aging of clean foams occurs with time as bubbles rapidly coalesce by film rupture and finally evolve toward a new quasi-equilibrium state. Here we find that foam aging is analogous to biological aging: the death rate of bubbles increases exponentially with time, which is similar to the Gompertz mortality law for biological populations. The coalescence evolution of foams is self-similar regardless of initial conditions. The population change of bubbles is well described by a Boltzmann sigmoidal function, indicating that the foam aging is a phase transition phenomenon. This result suggests that foams can be useful model systems for giving insights into biological aging.

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