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Capturing gas in soft granular media[1] CHRIS MACMINN, JEREMY LEE, University of Oxford, FENG XU, Texas A&M University, SUNGYON LEE, University of Minnesota — Bubble migration through soft granular materials involves a strong coupling between the bubble dynamics and the deformation of the material. This process is relevant to a variety of natural and industrial systems, from fluidized-bed reactors to the migration and venting of biogenic gas in sediments. Here, we study this process experimentally by injecting air into a quasi-2D, liquid-saturated packing of soft particles and measuring the morphology of the bubbles as they invade and then rise due to buoyancy. By systematically varying the confining stress, we show that the competition between buoyancy, capillarity, and elasticity leads to complex bubble-migration dynamics that transition from fluidization to pathway opening to pore invasion, with a strong and surprising impact on the amount of air trapped in the system.

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