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Air-stable droplet interface bilayers CHARLES COLLIER, ORNL, ORNL TEAM — Droplet interface bilayers are versatile model membranes useful for synthetic biology and biosensing; however, to date they have been for the most part confined to fluid reservoirs. Here, we demonstrate that when two or more water droplets meet on an oil-infused substrate, they exhibit noncoalescence due to the formation of a thin oil film that gets squeezed between the droplets from the bottom up. We show that when phospholipids are included in the water droplets, a stable droplet interface bilayer forms between the noncoalescing water droplets. As with traditional oil-submerged droplet interface bilayers, we were able to characterize ion channel transport by incorporating peptides into each droplet. We demonstrate the ability of these air-stable droplet interface bilayers (airDIBs) to incorporate ligand-gated ion channels via fusion of microsomes, which enables the biosensing of airborne matter.

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