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Assembly of transmembrane proteins on oil-water interfaces PETER YUNKER, Georgia Institute of technology, Harvard University, New England Biolabs, COREY LANDRY, Louisiana State University, SHAORONG CHONG, New England Biolabs, DAVID WEITZ, Harvard University — Transmembrane proteins are difficult to handle by aqueous solution-based biochemical and biophysical approaches, due to the hydrophobicity of transmembrane helices. Detergents can solubilize transmembrane proteins; however, surfactant coated transmembrane proteins are not always functional, and purifying detergent coated proteins in a micellar solution can be difficult. Motivated by this problem, we study the self-assembly of transmembrane proteins on oil-water interfaces. We found that the large water-oil interface of oil drops prevents nascent transmembrane proteins from forming non-functional aggregates. The oil provides a hydrophobic environment for the transmembrane helix, allowing the ectodomain to fold into its natural structure and orientation. Further, modifying the strength or valency of hydrophobic interactions between transmembrane proteins results in the self-assembly of spatially clustered, active proteins on the oil-water interface. Thus, hydrophobic interactions can facilitate, rather than inhibit, the assembly of transmembrane proteins.

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