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Formation, disruption and mechanical properties of a rigid hydrophobin film at an air-water interface[1] LYNN WALKER, STEPHANIE KIRBY, SHELLEY ANNA, Carnegie Mellon Univ, CMU TEAM — Hydrophobins are small, globular proteins with distinct hydrophilic and hydrophobic regions that make them extremely surface active. The behavior of hydrophobins at surfaces has raised interest in their potential industrial applications, including use in surface coatings, food foams and emulsions, and as dispersants. Practical use of hydrophobins requires an improved understanding of the interfacial behavior of these proteins, both individually and in the presence of surfactants. Cerato-ulmin (CU) is a hydrophobin that has been shown to strongly stabilize air bubbles and oil droplets through the formation of a persistent protein film at the interface. In this work, we characterize the adsorption behavior of CU at air/water interfaces by measuring the surface tension and interfacial rheology as a function of adsorption time. CU is found to strongly, irreversibly adsorb at air/water interfaces; the magnitude of the dilatational modulus increases with adsorption time and surface pressure, until the CU eventually forms a rigid film. The persistence of this film is tested through the addition of SDS, a strong surfactant, to the bulk. SDS is found to co-adsorb to interfaces pre-coated with a CU film. At high concentrations, the addition of SDS significantly decreases the dilatational modulus, indicating disruption and displacement of CU. These results lend insight into the complex interfacial interactions between hydrophobins and surfactants.

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