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Linear and Nonlinear Microrheology of Interfacial Protein Layers DANIEL ALLAN, DANIEL FIRESTER, VICTOR ALLARD, DANIEL REICH, ROBERT LEHENY, Johns Hopkins University — Proteins can adsorb to the airwater interface to form a robust layer. As protein accretes and a layer forms, we monitor the layer's shear rheology employing both passive and active microrheology. Measurements of the linear rheology, using multiple-particle-tracking techniques, show a transition from a viscous to elastic interface with increasing layer age. Active measurements of the nonlinear rheology, in which ferromagnetic nanowires at the interface rotate in response to magnetic torques, show that the protein layers behave quantitatively like a Hershel-Bulkley fluid. We interpret these observations in terms of mechanisms of layer formation and protein interactions at the interface.

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