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Visualizing the shape of soft solid and fluid contacts between two surfaces JONATHAN PHAM, FRANK SCHELLENBERGER, MICHAEL KAPPL, DORIS VOLLMER, HANS-JÜRGEN BUTT, Max Planck Institute for Polymer Research — The soft contact between two surfaces is fundamentally interesting for soft materials and fluid mechanics and relevant for friction and wear. The deformation of soft solid interfaces has received much interest because it interestingly reveals similarities to fluid wetting. We present an experimental route towards visualizing the three-dimensional contact geometry of either liquid-solid (i.e., oil and glass) or solid-solid (i.e., elastomer and glass) interfaces using a home-built combination of confocal microscopy and atomic force microscopy. We monitor the shape of a fluid capillary bridge and the depth of indentation in 3D while simultaneously measuring the force. In agreement with theoretical predictions, the height of the capillary bridge depends on the interfacial tensions. By using a slowly evaporating solvent, we quantify the temporal evolution of the capillary bridge and visualized the influence of pinning points on its shape. The position dependence of the advancing and receding contact angle along the three-phase contact line, particle-liquid-air, is resolved. Extending our system, we explore the contact deformation of soft solids where elasticity, in addition to surface tension, becomes an important factor.

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