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**Laser-induced Microparticle Impact Experiments on Soft Materials** STEVEN KOOI, DAVID VEYSSET, ALEXEI MAZNEV, YUN JUNG YANG, BRADLEY OLSEN, KEITH NELSON, MIT — High-velocity impact testing is used to study fundamental aspects of materials behavior under high strain rates as well as in applications ranging from armor testing to the development of novel drug delivery platforms. In this work, we study high-velocity impact of micron-size projectiles on soft viscoelastic materials including synthetic hydrogels and gelatin samples. In an all optical laser-induced projectile impact test (LIPIT), a monolayer of microparticles is placed on a transparent substrate coated with a laser absorbing polymer layer. Ablation of a laser-irradiated polymer region accelerates the microparticles which are ejected from the launching pad into free space, reaching controllable speeds up to 1.5 km/s depending on the laser pulse energy and particle characteristics. The particles are monitored while in free space and after impact on the target surface with an ultrahigh-speed multi-frame camera that can record up to 16 images with time resolution of each frame as short as 3 ns. We present images and movies capturing individual particle impact and penetration in gels, and discuss the observed dynamics in the case of high Reynolds and Weber numbers. The results can provide direct input for modeling of high-velocity impact responses and high strain rate deformation in gels and other soft materials..

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