

Abstract Submitted  
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**Highly-focused high-speed impact on soft material: Application for needle-free injection device** YOSHIYUKI TAGAWA, NIKOLAI OUDALOV, CLAAS WILLEM VISSER, CHAO SUN, DETLEF LOHSE, University of Twente — The development of needle-free drug injection systems is of great importance to global healthcare. Existing methods use diffusive jets, which suffer from insufficient penetration into the skin. We established a novel method of creating microjets with a very sharp geometry and controlled velocities even for supersonic speeds up to 850 m/s. In this presentation we demonstrate that it is possible to penetrate human skin using these jets and in this way deliver liquid substances to the human body. The penetration depth is much deeper than those of conventional methods. Further penetration dynamics is studied through experiments performed on gelatin mixtures. A model based on Stokes-like drag is proposed to predict the depth of the penetration.

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