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Supersonic microjets induced by hemispherical cavitation bubbles ROBERTO GONZALEZ-AVILA, CHAOLONG SONG, CLAUS-DIETER OHL, Nanyang Tech Univ — In recent years methods to produce fast microjets have received significant attention due to their potential to be employed in needle-free injection devices that can provide mass inoculation. In this talk we present a novel technique capable of producing jets that can reach up to 400 m/s. The jets are produced by a device that consists only of two electrodes on a plastic substrate and a tapered hole of $13 \sim 20$ μm between them. A short pulse of electric current is applied to the electrodes, then a spark bridges between the electrodes creating a cavitation bubble. Liquid is accelerated through the hole during the expansion and collapse of the bubble producing two separate jets. We found that as the exit velocity of the jet increases the jets become unstable. The second jet exiting the hole, usually faster than the first jet exits as a spray. The effect of viscosity was also studied with silicone oils up to 100 cSt. Finally, we also demonstrate that the jets can penetrate into soft material, thus they have the potential to be used in a needle-free drug-delivery application.

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