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Cusp formation in drops inside Taylor cones ALVARO G. MARIN, Univ. of Seville, IGNACIO G. LOSCERTALES, Univ. of Malaga, ANTONIO BARRERO, Univ. of Seville — Here, we report the formation of cusp in insulating drops inside compound Taylor cones. The action of the electrical shear stress acting on the outer interface, which is transmitted by viscous forces inside the Taylor cone, tends to deform the drop of insulating liquid placed inside. For appropriate values of the capillary number, the insulating drop develops a steady cusp angle which depends on both the capillary number and the conducting to insulating viscosity ratio. A self-similar analysis has been developed to qualitatively describe the flow inside these compounds Taylor cones. Any perturbation of the cusp gives rise to an intermittent emission of tiny droplets; this effect may recall the tip-streaming observed by G.I. Taylor in his four-roll mill device. This emission can be stabilized by an appropriate control of the injected flow rate of the insulating liquid. When the capillary number increases, the cusped interface turns into a spout which flows coated by the conducting liquid forming the electrified coaxial jet which has been successfully employed for the production of nanocapsules, coaxial nanofibers and nanotubes (*Science* 295, n. 5560, 1695, 2002; *JACS* 126, 5376, 2004).

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