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Particle deposition in a capillary tube during the translation of a suspension slug[1] DEOK-HOON JEONG, ANEZKA KVASNICKOVA, JEAN-BAPTISTE BOUTIN, University of California, Santa Barbara, DAVID CEBRON, ISTerre, Universite Grenoble Alpes CNRS, ALBAN SAURET, University of California, Santa Barbara — The translation of a liquid slug in a capillary tube leads to coating a thin film on the tube's inner wall. When particles or contaminants are present in the liquid, they can be deposited and contaminate the tube if the liquid film is thick enough. We investigated experimentally the condition under which particles are deposited by initially filling a capillary tube with a particulate suspension, and then expelling it at a prescribed velocity. We observed that the entrainment of particles in the liquid film is controlled by the ratio of the particle, the capillary tube radii and the capillary number associated with the liquid/air interface velocity. A model that accounts for these observations is developed and suggests optimal operating conditions to avoid contamination during withdrawal of a particulate suspension. This deposition mechanism can also be leveraged to developing new coating methods by depositing particles on the inner walls of channels.

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Deok-Hoon Jeong
University of California, Santa Barbara

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