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Sheath-Free Elasto-Inertia Separation of Particles Based on Shape in Straight Rectangular Microchannels. XIANGCHUN XUAN, XINYU LU, Clemson University — We demonstrate the use of straight rectangular microchannels to obtain a shape-based separation of equal-volumed spherical and peanut-shaped particles in viscoelastic fluids. This continuous sheath-free separation arises from the shape-dependent equilibrium particle positions as a result of the flow-induced elasto-inertial lift. A continuous transition from single to dual and to triple equilibrium positions is observed for both types of particles with the increase of flow rate. However, the flow rate at which the transition occurs differs with the particle shape, which is thought to correlate the rotational effects of non-spherical particles.

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