Movie 1: Video clip for figure 3. Breakup process of particle-laden droplet and silicone oil droplet in bag breakup mode.

Movie 2: Video clip for figure 4. Breakup process of particle-laden droplet and silicone oil droplet in bag-stamen breakup mode.

Movie 3: Video clip for figure 5. Breakup process of particle-laden droplet and silicone oil droplet in low-order multimode breakup mode.

Movie 4: Video clip for figure 6. Breakup process of particle-laden droplet and silicone oil droplet in high-order multimode breakup mode.

Movie 5: Video clip for figure 7. Breakup process of particle-laden droplet with larger particle size *dp* = 180 μm in low-order multimode breakup mode.

Movie 6: Video clip for figure 8. Breakup process of particle-laden droplet and silicone oil droplet in shear-stripping breakup mode.