Drop impact on superamphiphobic surfaces

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The dynamics of liquid drops impacting superamphiphobic coatings is studied by high speed video microscopy. Superamphiphobic coatings repel water and oils. The coating consists of a fractal-like hydrophobized silica network. Three experimental setups are discussed:

- Impact of mixtures of ethanol-water and glycerin-water drops: The contact time increases with impact velocity, whereas the restitution coefficient decreases. We suggest that the drop temporarily impales the superamphiphobic coating, although the drop completely rebounds.

- Impact of drops on a superamphiphobic mesh: For an impacting water drop, a shower of secondary droplets is produced. Compared to neat steel meshes, superamphiphobically coated meshes produce more monodisperse secondary droplets.

- Impact of an oil drop on an identical sessile drop: We experimentally and numerically investigate the impact and rebound dynamics of an oil drop impacting a sessile oil drop sitting on a superamphiphobic surface as function of velocity and degree of head-on alignment. The simulations quantitatively reproduce all experimentally observed rebound scenarios and allow quantifying the velocity profiles, the energy transfer and the viscous dissipation