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Evaporation of binary-mixture liquid droplets: how to make flattened micro-drops AMIR PAHLAVAN, Princeton University, COLIN BAIN, Durham University, HOWARD STONE, Princeton University — Spreading and evaporation of drops is ubiquitous in nature and technology, from rain drops on a window to inkjet printing. During their entire evolution, these droplets are often assumed to retain a spherical cap shape to minimize their interfacial energy. Here, we show that in the case of binary mixture liquid droplets, surprisingly, the drop profiles can substantially deviate from the spherical cap shape, and even become completely flattened much like a micron-thick pancake. We explain these observations based on the differential evaporation of the two liquid components in the mixture that leads to a gradient in surface tension along the drop interface, driving a solutal Marangoni flow towards the edge of the droplet. We demonstrate that when this solutal Marangoni flow dominates over the opposing capillary flow, flattened drops form.

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