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# Life and death of binary-mixture liquid droplets : picoliter pancakes

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Small multicomponent droplets are of increasing importance in a plethora of technological applications ranging from the fabrication of self-assembled hierarchical patterns to the design of autonomous fluidic systems. While often far away from equilibrium, involving complex and even chaotic flow fields, it is commonly assumed that in these systems with small drops surface tension keeps the shapes spherical. Here, studying picoliter volatile binary-mixture droplets of isopropanol and 2-butanol, we show that the dominance of surface tension forces at small scales can play a dual role: minute variations in surface tension along the interface can create Marangoni flows that are strong enough to significantly deform the drop, forming micron-thick pancake-like shapes that are otherwise typical of large puddles. We identify the conditions under which these flattened shapes form and explain why, universally, they relax back to a spherical-cap shape towards the end of drop lifetime. We further show that the formation of pancake-like droplets suppresses the “coffee-ring” effect and leads to uniform deposition of suspended particles. The quantitative agreement between theory and experiment provides a predictive capability to modulate the shape of tiny droplets with implications in a range of technologies from fabrication of miniature optical lenses to coating, printing and pattern deposition.