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Compound droplets on fibers FLORIANE WEYER, LAURENT DREESEN, MARJORIE LISMONT, NICOLAS VANDEWALLE, GRASP, University of Liege, B4000 Liege, Belgium — The development of a fiber-based digital microfluidics device mimicking biological membranes requires the formation and the manipulation of compound droplets in order to prevent contamination and evaporation. In the present work, we propose a study of compound water-oil droplets on fibers. Although the case of pure droplets is well established, we show herein that the situation becomes more complex for compound fluidic systems. In particular conditions, contact lines are merging and quadruple contact lines are formed. Depending on the formation of this quadruple line, the behavior of the compound droplet is different from pure systems. Two different aspects are then addressed: the equilibrium position and the maximum size of the droplets on the fiber, being obtained by the balance of capillary and gravity forces. Finally, we show that the characteristic length is the fiber diameter or the size of the core droplet depending on whether a quadruple line is formed.

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