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Sessile nanodroplets on elliptical patches of enhanced lyophilicity IVAN DEVIC, University of Twente, GIUSEPPE SOLIGNO, MARJOLEIN DIJK-STRA, REN VAN ROIJ, Utrecht University, XUEHUA ZHANG, RMIT University, Melbourne, DETLEF LOHSE, University of Twente — We theoretically investigate how nanodroplets wet lyophilic elliptical patches in a lyophobic surrounding on a flat substrate. To do so, we minimize the interfacial energy of the nanodroplet using Surface evolver and Monte Carlo calculations, finding decent agreement between the two methods. We can observe four different wetting phases, which are controlled by the aspect ratio of the ellipse and the Young's contact angles. Of particular interest is the behavior of the contact angle of the nanodroplet along the contact line, with which we can explain why the wetting phase transitions occur. We find that the contact angle of the nanodroplet can only change along the rim of the elliptical patch, while the nanodroplet satisfy Young's equation once the contact line is either inside or outside of the patch. The contact line of the nanodroplet, depending on Young's angles and the aspect ratio of the elliptical patch, may be completely pinned to the rim of the elliptical patch, while for some cases we find that the nanodroplet starts to expand to lyophobic surrounding, although there still is lyophilic surrounding available to wet.

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