SUPPLEMENTARY MATERIALS: Inverted Leidenfrost-like effect during condensation

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Supplementary Note S1: Contact angles and spreading coefficients

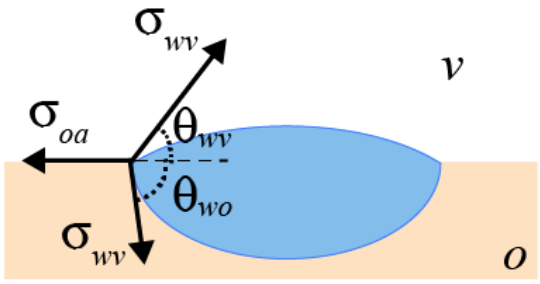

Fig. S1 : A water droplet on a non-cloaking oil

The surface tension of water, oil and the interfacial tension between the liquids can be used to evaluate the spreading characteristics of the oil and the water as shown in Table S1 below

Phase Change Material	σ_{wv}	σ_{ov}	σ_{wo}	$S_{wo(v)} = \sigma_{ov} - \sigma_{wv} - \sigma_{wo}$	$S_{ow(v)} = \sigma_{wv} - \sigma_{ov} - \sigma_{wo}$
	$mN.m^{-1}$	$mN.m^{-1}$	$mN.m^{-1}$	$mN.m^{-1}$	$mN.m^{-1}$
Cyclohexane	72.2	26.91[1]	50.2[2]	-95.49	-4.91

Table S1: Surface tension and spreading coefficient relation between water and cyclohexane

Based on Fig. S1 and Table S1, the contact angles of a water droplet in cyclohexane can be evaluatd by balancing interfacial forces at the three phase contact line as :

$$\sigma_{wo}\sin\theta_{wo} = \sigma_{wv}\sin\theta_{wv} \;, \quad \sigma_{wv}\cos\theta_{wv} + \sigma_{wo}\cos\theta_{wo} = \sigma_{ov}$$

$$\cos\theta_{lo} = \frac{\sigma_{ov}^2 + \sigma_{wo}^2 - \sigma_{wv}^2}{2\sigma_{ov}\sigma_{wo}} = 136.774^o \quad \text{and} \quad \cos\theta_{lv} = \frac{\sigma_{ov}^2 + \sigma_{wv}^2 - \sigma_{ow}^2}{2\sigma_{wv}\sigma_{ov}} = 28.437^o$$

$$\Rightarrow \theta_{wv} + \theta_{wo} = 165.211^o$$

References

1. Yaws, C. L. *Yaws' Handbook of Thermodynamic and Physical Properties of Chemical Compounds*; Knovel 2003.
2. Demond, A. H.; Lindner, A. S., Estimation of interfacial tension between organic liquids and water. *Environmental science & technology* **1993,** 27, (12), 2318-2331.