Abstract Submitted
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Spontaneous Imbibition Dynamics of an n-Alkane in Nanopores: Evidence of Meniscus Freezing and Monolayer Sticking PATRICK HUBER, SIMON GRUENER, Experimental Physics, Saarland University, D-66041 Saarbruecken (Germany), SAARLAND UNIVERSITY COLLABORATION — Capillary filling dynamics of liquid n-tetracosane (n-$C_{24}H_{50}$) in a network of cylindrical pores with 7 and 10 nm mean diameter in monolithic silica glass (Vycor) exhibit an abrupt temperature-slope change at $T_s = 54\,^{\circ}\mathrm{C}$, $\sim 4\,^{\circ}\mathrm{C}$ above bulk and $\sim 16\,^{\circ}\mathrm{C}$, $8\,^{\circ}\mathrm{C}$, resp., above pore freezing. It can be traced to a sudden inversion of the surface tension's T-slope, and thus to a decrease in surface entropy at the advancing pore menisci, characteristic of the formation of a single solid monolayer of rectified molecules, known as surface freezing from macroscopic, quiescent tetracosane melts. The imbibition speeds, that are the squared prefactors of the observed square-root-of-time Lucas-Washburn invasion kinetics, indicate a conserved bulk fluidity and capillarity of the nanopore-confined liquid, if we assume a flat lying, sticky hydrocarbon backbone monolayer at the silica walls.
(1) Simon Gruener and Patrick Huber, *Physical Review Letters* **103**, 174501 (2009).

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