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Langmuir-Gibbs Surface Phases and Transitions BENJAMIN OCKO, Brookhaven National Laboratory, ELI SLOUTSKIN, ZVI SAPIR, LILACH TAMAM, MOSHE DEUTSCH, Bar Ilan University, COLIN BAIN, Durham University — Recent synchrotron x-ray measurements reveal surface ordering transitions in films of medium-length linear hydrocarbons (alkanes), spread on the water surface. Alkanes longer than hexane do not spread on the free surface of water. However, sub-mM concentrations of some anionic surfactants (e.g. CTAB) induce formation of thermodynamically stable alkane monolayers, through a “pseudo-partial wetting” phenomenon[1]. The monolayers, incorporating both water-insoluble alkanes (Langmuir) and water-soluble CTAB molecules (Gibbs) are called Langmuir-Gibbs (LG) films. The films formed by alkanes with $n \leq 17$ exhibit ordering transition upon cooling [2], below which the molecules are normal to the water surface and hexagonally packed, with CTAB molecules randomly mixed inside the quasi-2D crystal. Alkanes with $n > 17$ can not form ordered LG monolayers, due to the repulsion from the $n = 16$ tails of CTAB. This repulsion arises from the two chains' length mismatch. A demixing transition occurs upon ordering, with a pure alkane quasi-2D crystal forming on top of disordered alkyl tails of CTAB molecules. [1] K.M. Wilkinson *et al., Chem. Phys. Phys. Chem.* **6**, 547 (2005). [2] E. Sloutskin, Z. Sapir, L. Tamam, B.M. Ocko, C.D. Bain, and M. Deutsch, *Thin Solid Films*, in press; K.M. Wilkinson, L. Qunfang, and C.D. Bain, *Soft Matter* **2**, 66 (2006).

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