

« Quasi-Liquid » Disorder of Alkane Chains Under Sub-Nanometric Supramolecular Confinement

Céline Mariette^a, Bertrand Toudic^a, Philippe Rabiller^a, Laurent Guérin^a and Alexei Bosak^b

^a*Institut de Physique de Rennes*

^b*ESRF, Grenoble*

The literature concerning uni-dimensional « liquid-like » phases in solid host matrix is very broad.^{1,2} This work has been generalized here for the confinement of linear alkane guest (C_nH_{2n+2}) in an urea host matrix ($CO(NH_2)_2$). These inclusion compounds are known to be a prototype family of aperiodic materials when the guest molecule is long enough ($n>13$).³ We will show here that specific signatures exist in the case of shorter guest molecules, the crystal being stable for $n > 7$. Translational disorder appears then to be very important, allowing real sliding of the guest molecules. The short range order in this phase is reflected by a very structured diffuse scattering image. The purely local order in the high temperature “liquid-like” phase leads at low temperature to long range order that may be commensurate ($n=8$ and $n=11$) or correspond to an monoclinic incommensurately modulated composite ($n=7$ or $n=12$).^{4,5}

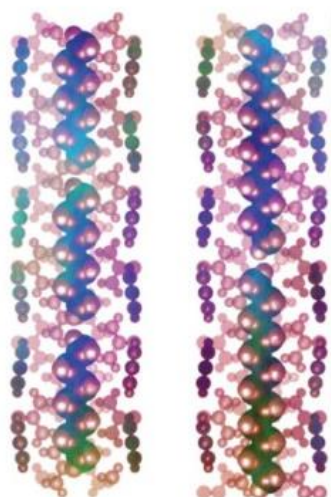


Figure 1: n-dodecane and n-heptane/urea liquid chains confined in the rigid urea matrix.

1. Heilmann *et al.*, *Phys. Rev. B*, **1979**. 20, 2, 751.
2. Albouy *et al.*, *Phys. Rev. B*, **1987**. 35, 173.
3. Toudic *et al.*, *Science*, **2008**. 319, 69.
4. Mariette *et al.*, *J. Chem. Phys.* **2012**. 136, 104507.
5. Mariette *et al.*, *Z. Kristallogr.* **2015**. 230(1), 23–35.