

Abstract Submitted
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Non-translational Molecular Diffusive Motion on Two Different Time Scales in Alkane Nanoparticles¹ S.-K. WANG, M. BAI, H. TAUB, U. Mo.-Columbia, E. MAMONTOV, K.W. HERWIG, ORNL, F.Y. HANSEN, Tech. U. Denmark, J.R.D. COPLEY, T. JENKINS, M. TYAGI, NIST, U.G. VOLKMANN, P. U. Catolica Chile — Using quasielastic neutron scattering, we have investigated molecular diffusive motion in n -C₃₂H₆₆ nanoparticles whose structure and phase transitions have been studied previously.² The spectra reveal non-translational (dispersionless) diffusive motion occurring simultaneously on time scales of ~ 1 ns and ~ 40 ps. The onset of the faster motion occurs in the crystalline phase at least 15 K below the melting point and is tentatively identified with rotation about the long molecular axis. Similarly, we suggest that the slower motion involves molecular conformational changes whose onset appears to coincide with the abrupt transition to the bulk rotator phase about 3 K below melting. These two types of diffusive motion bear a strong resemblance to those observed previously in C24 monolayers adsorbed on a graphite surface.³ ²M. Bai *et al.*, *Europhys. Lett.* **79**, 26003 (2007). ³F. Y. Hansen *et al.*, *Phys. Rev. Lett.* **92**, 046103 (2004)].

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