

# Host-guest interactions in clathrate materials at the light of IXS

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Host-guest interactions in nanointercalated materials are at the origin of a number of attractive properties including superconductivity, thermoelectricity or enhanced mechanical stability. I will show that X-ray inelastic scattering can be used as a local probe for the study of such interactions. First I will show how IXS can contribute to the study of the dynamics of silicon clathrates, face to other techniques probing the phonon- DOS<sup>1</sup>. Then, after emphasizing the local character of the IXS probe in these host-guest materials, I will concentrate on the study of the nature of a very particular type of pressure induced phase transition. We will explore the potential of IXS for the elucidation of the nature of the isostructural homothetic volume collapse of silicon clathrate materials in the case of Ba<sub>8</sub>Si<sub>46</sub><sup>2</sup>.

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<sup>1</sup> *"Phonon density of states in the clathrate superconductors Ba<sub>8</sub>Si<sub>46</sub> and Ba<sub>24</sub>Si<sub>100</sub>"*

R. Lortz, R. Viennois, A. Petrovic, P. Toulemonde, C. Meingast, M.M. Koza, H. Mutka, A. Bossak and A. San Miguel, to be submitted

<sup>2</sup> *"Pressure induced homothetic volume collapse in silicon clathrates"*.

A. San Miguel, A. Merlen, P. Toulemonde, T. Kume, S. Le Floch, A. Aouizerat, S. Pascarelli, G. Aquilanti, O. Mathon, T. Le Bihan, J.P. Itié, S. Yamanaka, Europhysics Lett, **69**, 556 (2005).