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Study of the Confinement of Methyl Iodide in Porous Glass

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Beamline(s): X18A

Introduction: It is known that confinement of a material can lead to phase transitions that differ from that of the bulk material. Specifically, confined systems show a hysteresis in the liquid-solid phase transition, meaning that there is suppression in solidification temperature, and increase in the melting point temperature. On beam line X18A we did temperature dependent x-ray diffraction studies to observe the effect of confinement on methyl iodide in porous glass. The methyl iodide was confined in pores of varying pore diameter, ranging from approximately 25Å to 200Å. It was postulated that with an increase in the level of confinement comes an increase in the hysteresis observed. The measurements allowed us to observe both the liquid and solid phases, and more specifically to carefully track the transition from solid to liquid in fine detail.
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Methods and Materials: Temperature dependent x-ray diffraction on methyl iodide in porous glass

Results: Able to observe hysteresis

Conclusions: X-ray diffraction quickly and easily allowed the observation of the liquid-solid phase transition

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References: [1] D.W. Brown, P.E. Sokol and S.N. Erlich, "New Disorder Induced Phase Transitions of Rare Gases in Porous Vycor Glass", PRL, 81,1019, (1998)