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Inelastic neutron scattering from confined molecular oxygen.[1]
PAUL SOKOL, DUNCAN KILBURN, Indiana University — We report results from experiments measuring the generalized density of states in confined solid molecular oxygen. It is known from previous experiments that fundamental properties of liquids and solids, such as phase transition temperatures and intermolecular structure can be altered by confining them in porous media (pores typically in the angstrom to nanometer range). It is reasonable therefore to ask the question: what is the effect of confinement on collective excitations in the material, and can these changes be exploited in a technological setting? Using inelastic neutron scattering we find that both the structure and generalized density of states of solid molecular oxygen are altered by confining it in a templated porous glass with a mean pore diameter of 100 Angstroms. The structure, in the Q-range which we were able to measure, resembles that of an amorphous material and the density of states are shifted to lower energy excitations. One possible application for such a material is as moderator material in a very cold neutron source.

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