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**Thermodynamic Phase Diagram of Hydrogen in Nano-porous Silica** ELI VAN CLEVE, SERGEI KUCHEYEV, Lawrence Livermore National Laboratory — One of the major challenges faced by inertial confinement fusion (ICF) is spherical uniformity of fuel capsules. Most current ignition target designs call for spherically uniform layers of deuterium-tritium (DT) mix in a solid phase. Smooth solid DT layers of high-quality single crystals are necessary, requiring stringent layering protocols. Liquid DT confined in a low-density nano-porous scaffold layer is a possible alternative target, having greatly relaxed layering requirements. Hydrogen in vycor, which has a high density and a relatively uniform pore size distribution, has previously been studied. The porous materials used for this study are silica aerogels. These have ultralow densities and broad pore size distributions. We discuss the thermodynamic phase diagram of hydrogen and deuterium condensed in silica aerogels studied using relaxation calorimetry. We find that crystallization temperatures of both isotopes are suppressed inside the aerogel; however, the freezing takes place over a relatively wide range of temperatures and non-trivially depends on the hydrogen filling fraction. We discuss the correlation of freezing temperatures with the pore size distribution. This work was performed under the auspices of the U.S. DOE my LLNL under Contract DE-AC52-07NA27344.

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