Abstract Submitted
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Synthesis of Calcium polyhydrides at high pressure and high temperature[1] AJAY KUMAR MISHRA, MUHTAR AHART, MADDURY SOMAYAZULU, C. Y. PARK, Geophysical Laboratory, Carnegie Institution of Washington, Washington DC, RUSSEL J. HEMLEY, George Washington University, Washington DC — With the discovery of highest Tc, in H2S system by Drozdov et al. there is a renewed interest in synthesizing hydrogen rich materials as possible high Tc conventional superconductors. Recently there have been first principles predictions about alkaline and transition metal hydrides which are predicted to have higher T_C. Hence, in order to synthesize higher hydrides of calcium we have loaded calcium metal and hydrogen in diamond anvil cell equipped with internal resistive heater. A new polyhydride of calcium, CaHx (x>2) is synthesized at high pressure and high temperatures ˜22 GPa and 500 deg C. It has been characterized and its structure is determined to be double hexagonal type. Compression behavior of this new hydride has been studied. On decompression it is unstable and decomposes into lower polyhydride of calcium. At higher pressures of ˜121 GPa and 600 deg C, single crystal like new polyhydride CaHx with larger unit cell has been synthesized. We will present details of this newly synthesized superhydride as well as our attempts to characterize its superconducting properties.

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