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Interactions between hydrogen and silane at high pressure SHIBING WANG, Department of Applied Physics, Stanford University, WENDY L. MAO, Department of Geological and Environmental sciences, Stanford University, HO-KWANG MAO, XIAO-JIA CHEN, Geophysical Laboratory, Carnegie Institution of Washington — Understanding the behavior of hydrogen-rich systems at extreme conditions has significance to both condensed matter physics and applied research areas like hydrogen storage. We report the high-pressure study of the SiH_4-H_2 binary system at 300K in a diamond anvil cell. Raman measurements indicate significant intermolecular interactions between H_2 and SiH_4. We found that H_2 vibron frequency is significantly softened with the presence of SiH_4 for the fluid phase compared with pure H_2 fluid at the same pressures. In contrast, the Si-H stretching modes of SiH4 shift to higher frequency in the mixed fluid compared with pure SiH_4. Pressure induced solidification of the H_2-SiH_4 fluid shows a binary eutectic point at $\sim$ 72 mol% H_2 and $\sim$ 6.1 GPa, above which the fluid crystallizes into a mixture of two nearly end-member solids. We were able to superpressurize the sample above the eutectic pressure before complete crystallization, indicating extended metastability. The properties of the two nearly end-member solids will also be presented.

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