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Magnetic effects of H in Metals, the case of Iron[1] PATRICIO VARGAS, ANDREA LEN, JUAN MANUEL FLOREZ, Physics Department, USM, Valparaiso, Chile — A growing consensus on the possible role of hydrogen in future energy technology has incited worldwide efforts for the development of new hydrogen-storage materials and their application to rechargeable batteries and fuel cells. Meanwhile, research in the basic properties of metal-hydrogen systems has also been advanced. High-pressure experiments have unraveled new features of elemental hydrogen (phases of solid H2 and metallization of liquid H2 and superconductivity) as well as of many metal–hydrogen systems (superabundant vacancy formation, phase diagrams over wide p–x–T ranges) . In this work we address the magnetic changes induced by interstitial hydrogen in Fe. From the point of view of the Slater Pauli Curve, Fe alloys (Fe(1-x)Mx) show an increase of the magnetization (but always less than pure Fe) due substitutional non magnetic impurities like M = V, Cr, Ti. For the magnetic impurity Cobalt, the Slater Pauli Curve reaches its maximum of about 2.5 Bohr magnetons per atom when x=0.4. For an interstitial impurity H, which adds one electron to the system, we observe an increasing of the magnetization too but less than the effect induced by the volume expansion. Therefore like the case of NiHx , one of the effects of interstitial hydrogen on a ferromagnetic material is to fill the minority spin states .

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Patricio Vargas
USM

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