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Structure-Property relationship for H covered Fe3O4(001)¹ FANGYANG LIU, Louisiana State Univ - Baton Rouge, ORHAN KIZILKAYA, Center for Advanced Microstructures and Devices, Louisiana State University, PHILLIP SPRUNGER, RICHARD KURTZ, RONGYING JIN, JIANDI ZHANG, WARD PLUMMER, Louisiana State Univ - Baton Rouge — Magnetite (Fe3O4), the oldest permanent magnet, is still being studied, due to the fascinating surface properties. Clean B layer terminated Fe3O4(001) surface exhibits a ($\sqrt{2} \times \sqrt{2}$)R45 reconstruction, which as reported by LEED experiments can be removed by hydrogen adsorption at RT. However, the mechanism of this surface structural change is unknown. Combining HREELS, LEIS, ARXPS, UPS and XANES, we discovered a very unusual adsorption mechanism. Hydrogen appears to be bonded to the surface iron atoms not oxygen as expected. We observe H-Fe vibration mode with HREELS while no OH mode is present. Furthermore LEIS experiments confirmed H is on the iron atoms site. We will discuss the adsorption mechanism and electronic structure change with information provided by the core level photoemission techniques.

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