Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Lattice Dynamics of Hydrogenated Austenitic Steels SERGEY DANILKIN, ANSTO, ANSTO TEAM — We investigated hydrogen vibrations in of Fe-18Cr-10Ni and Fe-25Cr-20Ni austenitic steels doped in H gas atmosphere at pressures up to 7 GPa with maximum H content about H/Me=0.9. In case of less stable Fe-18Cr-10Ni alloy formation of the martensite phase was observed after hydrogen treatment [1]. Inelastic neutron scattering measurements were performed with spectrometers FANS at NIST and TOSCA at ISIS. Experiments show broad H peak in energy spectrum of scattered neutrons at frequencies above the metal band modes. Vibrational energy of H atoms in studied steels decreases from 132 meV at H/Me=0.0033 to 111 meV at H/Me=0.9 due to lattice dilatation [2]. The energy dependence of H modes on interatomic distance is compared with experimental data on other Me-H systems. The broadening of the H modes at H contents from 0.003 to 0.4 - where the single broad peak is observed - is most probably connected with the Me-H force constant disorder. At higher H contents - where H-peak has the two-component structure - the H-H interaction becomes important resulting in the dispersion of the optical phonon branches. [1]. M. Hoelzel, S.A. Danilkin, H. Ehrenberg, et al., Mat. Sci. Eng., 2004, v. A384, p. 255. [2]. M. Hoelzel, V. Rajevac, S.A. Danilkin, et al., J of Phys. – Cond. Mat., 2005, v. 17 (23), p. 3537.

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Date submitted: 22 Nov 2005 Electronic form version 1.4