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Vibrational Spectrum of "Crystalline Graphane" A.I. KOLESNIKOV, Oak Ridge National Laboratory, Oak Ridge, TN, USA, V.E. ANTONOV, I.O. BASHKIN, V.S. EFIMCHENKO, Ins. Solid State Physics RAS, Chernogolovka, Russia, G.E. GRANROTH, Oak Ridge National Laboratory, Oak Ridge, TN, USA, V.I. KULAKOV, Ins. Solid State Physics RAS, Chernogolovka, Russia, T. SHERLINE, Oak Ridge National Laboratory, Oak Ridge, TN, USA, ORNL TEAM, ISSP RAS TEAM — Since the discovery of graphene, a flat monolayer of carbon atoms, a great interest was attracted to synthesis of chemically modified carbon sheets. In particular, it was proposed that graphane, representing a graphene sheet saturated by hydrogen adsorbed from both sides, would be stable [1], and this prediction was confirmed by TEM [2]. Recently, hydrogenated graphite with a composition close to CH has been synthesized by exposing the graphite to gaseous hydrogen at P=2 to 7 GPa and T=350 to 450^{o}C [3]. The formation of hydrographite is accompanied by a 40% increase in the c-parameter of the unit cell. The IR spectrum shows a strong band near 2850 cm^{-1} due to stretching vibrations of the C-H covalent bonds. In the present work, we studied the vibrational spectrum of hydrographite by inelastic neutron scattering. The obtained spectrum is very similar to that calculated for a single graphane plane [4]. This suggests a weak interaction between the graphane layers in hydrographite, so it could be considered as a "crystalline graphane" material. 1. J.O. Sofo et al., PRB **75**, 153401 (2007). 2. D.C. Elias et al., Sci. **323**, 610 (2009). 3. I.O. Bashkin et al., Int. Symp. Metal-Hydr. Syst., Reykjavik, Iceland, 2008. 4. G. Savini et al., PRL **105**, 037002 (2010).

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