

Hydrogen content and Raman spectra of the hydrogenated nanostructured amorphous silica

Korotkova M A[®], Meletov K P and Efimchenko V S

Institute of Solid State Physics of the Russian Academy of Sciences,
Akademika Osipyana Street 2, Chernogolovka, Moscow Region 142432, Russia

[®] korotkova@issp.ac.ru

The silica glass particles with diameter 5 nm can form nanostructures with the surface square about few hundred m^2/g . The hydrogenation of one of these nanostructured silica glass with surface square $326 \text{ m}^2/\text{g}$ was carried out in a Toroid-type high-pressure apparatus at $P=5$ and 7.5 GPa and $T=250 \text{ }^\circ\text{C}$ for 24 hours and cooled to $-196 \text{ }^\circ\text{C}$ to prevent hydrogen losses in the course of the subsequent pressure release. The hydrogen contents for the both samples, obtained by the hot extraction into a pre-evacuated volume, had the values $\text{H}_2/\text{SiO}_2=0.55$ and 1 respectively. The Raman spectra of the both samples showed that dissolved hydrogen had the molecular form. However, the profiles and positions of the H_2 rotational and stretching lines on these Raman spectra denote on a significant amount of hydrogen molecules probably dissolved on the surface of SiO_2 particles.