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Surface effect on the medium-range structure of colloidal and mesoporous silica¹ GANG CHEN, KUANGMIN LI, CONGSHANG WAN, Ohio University, DEPARTMENT OF PHYSICS AND ASTRONOMY TEAM — Glasses synthesized by the conventional melt-quenching method and by the sol-gel method do not have exactly the same structure. To understand the medium-range structure of sol-gel derived silica glasses, we have conducted small-angle and wide-angle x-ray scattering experiments on colloidal and mesoporous silica. Effects of particle/pore size and thermal treatment on the first sharp diffraction peak (FSDP) of the silica have been studied. It is found that the FSDP of colloidal silica depends on the particle size as well as thermal treatment. For the mesoporous silica (i.e., MCM-41 and SBA-15), their FSDP differs from that of colloidal silica and shows pore size and/or pore surface morphology dependence. Thermal treatment of mesoporous silica at high temperature causes shrinkage in the pore width and a change in the FSDP. Our study suggests a close relationship between the surface properties and the medium-range structure of sol-gel derived silica glasses.

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