Strucrture of silica glass under extreme conditions revealed by diffraction measurement and topological analsysis

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Silica glass is a prototypical network-forming glass, which exhibits a tetraheral network with sharing oxygen atoms at the corner of SiO_4 tetrahedra. It is well known that tetreahedral network glasses show a first sharp diffraction peak (FSDP) in diffraction data, manifested by intermediate-range ordering with the formation of cavities. It is interesting to reveal the behaviour of structral modification at intermediate-range scale associated with the reduction of cavities and the modification of short-range ordering under high temperatures and high pressures. Our recent researches on silica glass under extreme conditions by x-ray and neutron diffraction measreuments with the aid of computer simulations and topological analyses [1] are introduced. Furthermore, the mechanism of densification of silica glass under different extreme conditions is discussed.

[1] Hiraoka *et al.* (2016) Proc. Natl. Acad. Sci. U.S.A. **113**, 7035–7040.