Poster Presentation

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Local structures of Zr in impact-related natural glass probed by XAFS

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The local structures of tektites and natural glasses were studied by Zr K-edge XANES and EXAFS in order to provide quantitative data on bonding distances and coordination numbers. The XAFS measurements were performed at the beam line BL-NW10A of the PF-AR in National Laboratory for High Energy Physics (KEK), Tsukuba, Japan. Zr4+ ion in tektite has different kinds of coordination environment. Various natural glasses are formed under different physical conditions. Impact-related glass, fulgurite and volcanic glasses are typical natural glasses. Upon a devastating impact of a giant meteoroid on the Earth, particles of the Earth's surface were melted and catapulted into outer space, where they finally solidified and fell back to the Earth. Tektites should be formed by this series of processes [1]. Tektite has special local structure of Ca[2]. Glass structure is affected by the pressure and temperature conditions during the glass formation and quenching process. This study indicated that different formation process of natural glasses gives different local structure of zirconium ions. The Zr K-edge XANES spectra of tektite have the double post-edge peaks with different heights. The volcanic glasses and other impact-related glasses such as impactite possessed more simple XANES patterns. The average coordination number of Zr4+ in darwin glass, LDG, volcanic glass and tektite are between 6 and 7. The eight-coordinated Zr4+ shows different XAFS pattern in suevite and köfelsite. All tektites are classified in same type. According to EXAFS measurements, Zr-O distances in tektites are 2.198 – 2.215Å and XANES spectra of tektites have similar shape. It indicates that tektites have similar Zr local structure with 7-fold coordination Zr ions. Impact-related glasses are classified to different types. Volcanic glasses are classified to same types. Impact glasses are formed under different geological processes at impact event and are experienced different physical environments.

[1] *L.Wang, et al., (2011), J.synchrotron Rad., 18, 885-890,* ***[2]*** *T.Tobase, et al., (2012), Journal of Physics: Conference Series, 430, 012070*

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