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Variety of Ti local structure in Tektite

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Tektite is formed as the meteorite impact the earth surface. Mass extinction is thought the reason of impact event, which is dated to 65 Ma. What happened at the event? According to research of tektite, speculate process of the event. Local structures of Sb, Zn in K-T clay are studied. Local structure of Ti in tektite is studied by X-ray Absorption Fine Structure (XAFS) method. XAFS is an advanced method, which can get detail information of valance state, neighboring atoms and the coordinated state. Local structures of Ti in tektites form different strewn fields are compared. The thresholds of XANES spectrum in various tektites are the same. They are also the same with nature minerals, which is Ti 4+. The intensity of pre-edge in moldavite is smaller than other tektites. But the previous studied by Farges, F. is shown the pre-edge intensity of Moldavite is strong as another tektite, and the coordination number is considered to four. According to the Fourier transformation spectrum are divided in three kinds. The Hainantite, Indochinite, Bediasite; Australite, Philippinite and the Moldavite; the Ti-O distance becomes large in proper order by each group. Coordination numbers and radial structure function determined by EXAFS analyses, we classified the tektites in three types: in Hainanite, Indochinite and Bediasite, Ti occupy 4-fold coordinated tetrahedral site and Ti-O distances are 1.84-1.79 Å; in Australite and Philippinite, Ti occupy 5-fold trigonal bi-pyramidal or tetragonal pyramidal site and Ti-O distances are 1.92-1.89 Å; in Moldavite, Ti occupy the 6-fold octahedral site and Ti-O distance is 2.00-1.96 Å. Ti occupies the TiO₆ octahedral site in many titanium minerals at ambient conditions. This study indicates that the local structure of Ti may be changed in the impact event and the following stage. Tektites splash to the space and travel in several kinds of processes and routes, which lead to different temperature and pressure history. Local structure of Ti should be related with the temperature, pressure, quenching rate, sizes of impact meteorite and size of falling melts. As a result, there are some differences in the bonding structure of Ti atoms and arrangements of neighbouring oxygen.

Keywords: local structure, titanium, tektite, XAFS