

## EXAFS study of titanium local structure in tektites

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The content of Ti in tektite is about 0.5wt%<sup>[1]</sup>, but the Ti local structure should contain abundant information for its formation. There is no related study on Ti local structure about EXAFS analysis on tektites. For making further studying becomes quantization, we used the EXAFS method.

In this study, we measured 7 samples from 2 strewnfields. We found three types of tektites were existed, though some of them are from the same strewnfield.

**Experimental**

The XAFS measurement of Ti local structure was preformed with a Si (111) double crystal monochromator at the beam line BL-9C and BL-12C of the Photon Factory in National Laboratory for High Physics (KEK), Tsukuba, Japan. Spectra near Ti K-edge were collected in transmission mode at the room temperature. Analyses of XAFS data were performed by using XAFS93.<sup>[2]</sup>

**Results and Discussion**

The EXAFS  $k^3\chi(k)$  function was transformed into the radial structure function (RSF) for Ti K-edge of nine tektites (Fig.1). The RSF for the Ti atom in Indochinite and Moldavite-Brownish are similar; Hainanite-Rim, Hainanite-Core, Australite and Philippinite are similar; and Moldavite-Green is distinguished. It indicates that they have same local atomic environmental around the Ti atoms and extended structure respectively.

In order to obtain the further information on structure parameters, we figured out the parameter fitting with analytical EXAFS formula. The obtained Ti-O distances are summarized in Table 1. Based on the local Ti-O distances, coordination numbers and radial structure function determined by EXAFS analyses, we classified the tektites in three types: in Indochinite and Moldavite-Brownish, Ti occupy 4-fold coordinated (tetrahedral site) and Ti-O distances are 1.812-1.835 Å; in Hainanite-Rim, Hainanite-Core, Australite and Philippinite, Ti occupy 5-fold (trigonal bi-pyramidal or tetragonal pyramidal site) and Ti-O distances are 1.868-1.921 Å in Moldavite-Green, Ti occupy the 6-fold (octahedral site) and Ti-O distance is 2.00-1.96 Å.

Local structure in synthesized silicate glass is studied. According previous research on synthetic glass,<sup>[4]</sup>Ti is

formed under high temperature, low pressure, but <sup>6</sup>Ti is formed under lower temperature, higher pressure. In other words, three types of tektites are formed under different physical conditions.

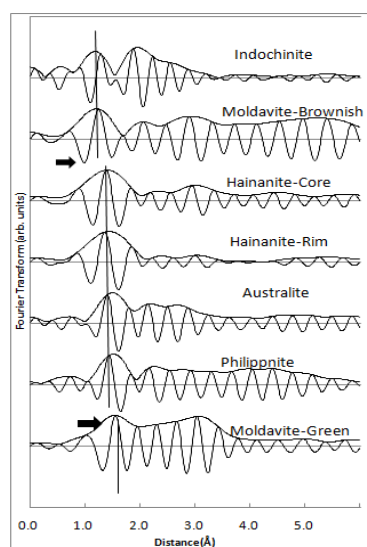


Fig.1 Fourier transforms of the Ti K-edge XAFS oscillation function  $k^3\chi(k)$  spectra, no phase shift correction are made

Table 1: The structure parameter determined by EXAFS

Sample name	C.N.	Ti-O distance(Å)
Indochinite	4	1.812(5)
Moldavite-Brownish	4	1.817(4)
Hainanite-Core	4,5	1.868(4)
Hainanite-Rim	5	1.888(6)
Australite	5	1.892(4)
Philippinite	5,6	1.921(5)
Moldavite-Green	6	2.001(4)

**References**

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