

**Fe AND Al COORDINATION IN TEKTITES AND IMPACT-GLASSES BY XAS.** G. Giuli<sup>1</sup>, E. Paris<sup>1</sup>, G. Pratesi<sup>2</sup>, C. Koeberl<sup>3</sup>, C. Cipriani<sup>2</sup>, <sup>1</sup>Dipartimento di Scienze della Terra and INFM, Università di Camerino, 62032 Camerino (MC), Italy, gabriele@camserv.unicam.it, <sup>2</sup>Museo di Storia Naturale, Sez. di Mineralogia e Litologia, Università di Firenze, Via La Pira 4, 50121 Firenze, Italy, <sup>3</sup>Institute of Geochemistry, University of Wien, Althanstrasse 14, A-1090 Vienna, Austria.

**Introduction:** A set of tektites and impactites from different localities have been studied by XAS in order to obtain information on the Fe and Al coordination number. The tektite samples have been chosen so as to represent all the four strewn fields (a cambodianite and an australite from the Australasian strewn field; a moldavite from the Central European strewn field; a bediasite from the North American strewn field; two Ivory Coast tektites from the Ivory Coast strewn field). The impactites have been chosen according to composition, provenance, and crater dimension.

**Experimental:** The samples have been studied by Al k-edge XANES and by Fe k-edge and EXAFS high resolution XANES. EXAFS data reduction, as well as comparison with the spectra of minerals with known structure allowed to interpret the spectra in terms of coordination number of the studied element.

**Results:**

*Aluminum coordination.* Al k-edge XANES spectra of all the tektites studied strongly resemble that of albite: general shape, peak and edge energy position are all consistent with those of albite (and of all standards with four-fold coordinated Al in general), indicating that virtually all of the Al is in four-fold coordination. Minor variations in the intensity of the main absorption peak are related to changes of the Al-O-T angle.

*Iron coordination.* Fe k-edge XANES spectra of the tektites are consistent with the presence of divalent iron whereas no trivalent Fe is detected, possibly due to poor detection limit of this technique in case of low Fe<sup>3+</sup>/Fe<sup>2+</sup> ratio. The intensity of the pre-edge peak is intermediate between that of staurolite (Fe<sup>2+</sup> in four-fold coordination) and grandidierite (Fe<sup>2+</sup> in five-fold coordination), thus suggesting a mean coordination number intermediate between 4 and 5. EXAFS analysis yielded a  $\langle\text{Fe-O}\rangle = 2.00 \pm 0.02 \text{ \AA}$  and a mean coordination number equal to 4 ( $\pm 0.5$ ). In particular, the resulting polyhedron around Fe is distorted, as the spectra can only be correctly fitted when taking into account two short and two long Fe-O distances (as in staurolite). The results from EXAFS data clearly suggest a distorted tetrahedral coordination around Fe. However, taking into account both the XANES data and the estimated error in the EXAFS derived CN, we infer the mean coordination number to be close to 4.5. Tektites Fe k-edge spectra strongly resemble each other, both in the XANES and EXAFS region, irrespective of their provenance. On the other

hand, appreciable differences can be noted with the spectra of impactites, especially in the pre-edge region. In particular, some impactites show additional shoulders in the pre-edge peak which can be interpreted as indicative of higher Fe<sup>3+</sup>/Fe<sup>2+</sup> ratio than the tektites.