

**NEW DATA ON THE Fe OXIDATION STATE AND WATER CONTENT OF BELIZE TEKTITES.** G. Giuli<sup>1</sup>, M. R. Cicconi<sup>1</sup>, P. Stabile<sup>1</sup>, A. Trapananti<sup>2</sup>, G. Pratesi<sup>3</sup>, M. Cestelli-Guidi<sup>4</sup>, and C. Koeberl<sup>5</sup>. <sup>1</sup>Geology Division, University of Camerino, 62032 Camerino, Italy; gabriele.giuli@unicam.it. <sup>2</sup>CNR-IOM OGG c/o European Synchrotron Radiation Facility (ESRF), Grenoble, France. <sup>3</sup>Dip. Scienze della Terra, University of Firenze, Italy, <sup>4</sup>Laboratori Nazionali Frascati, Istituto Nazionale Fisica Nucleare, Frascati, Italy, <sup>5</sup>University of Vienna and Natural History Museum, Burgring 7, 1010 Vienna, Austria.

**Introduction:** Tektites are distal impact ejecta that occur on Earth in geographically distinct and extended strewn fields. Three of the four strewn fields so far studied extend over the ocean and their limits are defined largely by the occurrence of microtektites in deep sea sediments with the same biostratigraphic age as the radiometric ages of the tektites on land.

Since 1992, several reports have been published on tektites found in the region of Tikal (Guatemala) and from Belize, suggesting the existence of a central American strewn field [1-7].

In order to compare Fe redox data of Belize tektites with those available in the literature for tektites from the other four strewn fields [8-10] we studied 8 tektites samples by means of X-ray Absorption Spectroscopy. We also report preliminary FTIR spectra that allow to quantify the water content of these samples.

Despite the availability of geochemical studies on tektites and microtektites, few studies exist of the Fe coordination number and oxidation state in such materials performed with the same technique on a large set of samples from different provenances. Such studies are of great importance for a more complete understanding of impact-generated glasses and, in particular, to try to reconstruct the oxygen fugacity conditions prevailing during impact melt formation.

**Experimental:** Iron oxidation states and coordination numbers have been determined by X-ray Absorption Near Edge Spectroscopy (XANES) on 8 tektite samples recovered from the Belize area. The XANES data have been collected at the BM08 beamline of the ESRF storage ring (Grenoble, F) using a Si (311) monochromator and with a beam size at the sample of 0.30 x 1.50 mm. Accurate analysis of the pre-edge peak energy position and integrated intensity, allowed to determine  $\text{Fe}^{3+}/(\text{Fe}^{2+} + \text{Fe}^{3+})$  ratios on all samples with an estimated error of  $\pm 0.05$  [12]. The samples for the FTIR measurements were prepared as 400 to 500  $\mu\text{m}$  thick double polished slides. FTIR microspectroscopy was performed using a standard vacuum Michelson interferometer coupled to an IR microscope inside a box purged in dry nitrogen. The source was a global mid-IR source and the detector was a photoconductive nitrogen cooled Mercury Cadmium Telluride (MCT). The samples were mounted on a ZnSe polished window and placed in the focal plane of the IR microscope on a micrometric stage, where it was scanned in transmission mode with a slit aperture size of 50  $\mu\text{m}$  and a 15X objective/condenser setup.

The reference spectra were taken on the same ZnSe substrate.

Each spectrum was recorded in the mid-IR frequency range, averaging  $N=256$  scans at  $2\text{ cm}^{-1}$  spectral resolution. The absorption band in the  $3200\text{-}3600\text{ cm}^{-1}$  region is related to the O-H stretching mode in confined water and the area under this peak can be directly linked to the water content in the compound.

Water contents were calculated according to the procedure by Gilchrist [14] following a standard application of the Lambert-Beer absorption law. The extinction coefficient used ( $74.8\text{ cm}^{-1}\text{ mol}^{-1}$ ) is in agreement with those used by [13-15].

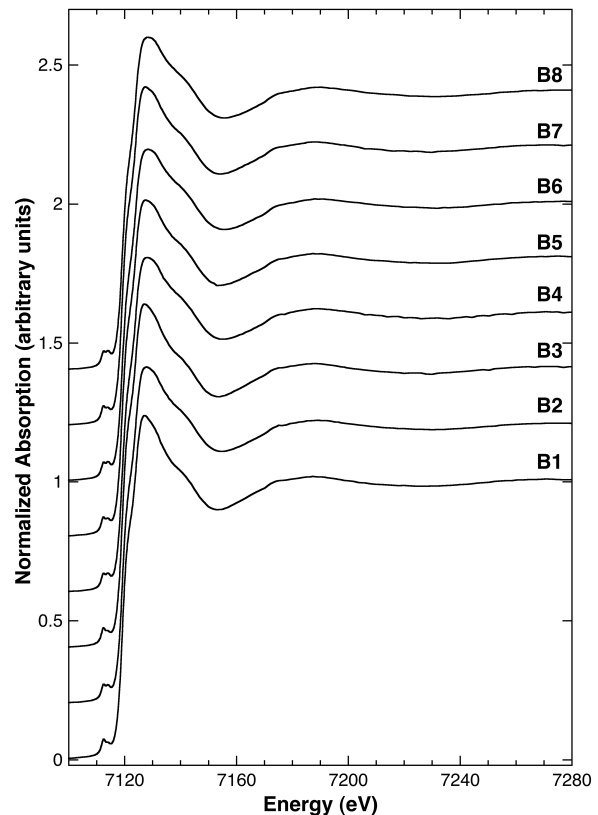


Fig. 1: Fe K-edge XANES spectra of Belize tektites.

**Results:** Tektites from Belize display XANES spectra whose shape is in agreement with those of tektites from Australasian, Ivory Coast, Central European, and North American Strewn fields [8-10]. Also edge energies are compatible with literature data and are compatible with Fe being mostly divalent. However, the pre-edge peak shape and energy position

display a remarkably higher variability with respect to tektite XANES spectra so far published. Accurate analysis of the pre-edge peak and comparison with Fe model compounds result in low values of the  $\text{Fe}^{3+}/(\text{Fe}^{2+}+\text{Fe}^{3+})$  ratio, compatible to tektites analyzed so far. FTIR spectra, despite preliminary, display a good signal to noise ratio. Water contents are in the range of other tektites reported in [11] and [13-15].

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