IRON OXIDATION STATE IN AUSTRALASIAN MICRO-TEKTITES BY HIGH-RESOLUTION XANES SPECTROSCOPY AND K_β-DETECTED XANES SPECTROSCOPY

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We examined the iron oxidation state and coordination number in 6 micro-tektites from the Australasian strewn field by a combination of high-resolution X-ray Absorption Near Edge Structure (XANES) and X-ray Emission spectroscopy (XES). The latter technique (K_β-detected XANES spectroscopy) has the advantage of displaying sharper peaks in the pre-edge region, thus allowing a better resolution and a more straightforward way of decomposing the pre-edge features into its components. The spectra have been collected at ID26 beamline of the ESRF storage ring (Grenoble, France). The X-ray beam (size = 30 x 80 μm) has been monochromatised with two Si (220) crystals. XANES and XES spectra consistently show small variations in the energy and intensity of the pre-edge peaks. Comparison with Fe model compounds with known Fe oxidation state and coordination number allowed us to estimate the Fe oxidation state for the micro-tektites under study.

Within experimental reproducibility, all the pre-edge peak energies of the micro-tektite samples plot very close to the divalent Fe model compounds. $Fe^{3+}/(Fe^{2+} + Fe^{3+})$ are estimated to be in the 0 to 0.1 range.

Comparison with literature data on splash form tektites from all four known strewn field [1] and impact glass from a K/T boundary layer [2] allows us to confirm that, as for the Fe oxidation state, Australasian micro-tektites are indistinguishable from splash form tektites. On the other hand, noticeable differences are observed with K/T impact glasses, which in the view of these data should not be considered as micro-tektites.

References: [1] Giuli G. et al. 2002. *Geochimica et Cosmochimica Acta*, 66:4347-4353. [2] Giuli G. et al. 2005. *Meteoritics and Planetary Science*, 40:1575-1580.