IRON REDOX VARIATIONS IN AUSTRALASIAN MUONG NONG-TYPE TEKTITES. G. Giuli[1], M.R. Cicconi[1], A. Trapananti[2], S.G. Eeckhout[3], G. Pratesi[4], E. Paris[1], and C. Koeberl[5]. [1]Scuola di Scienze e Tecnologie, sez. Geologia, Università di Camerino, Italy; E-mail: gabriele.giuli@unicam.it; [2] CNR-IOM OGG c/o ESRF, Grenoble, France; [3]European Synchrotron Radiation Facility (ESRF), Grenoble, France; [4]Dip. Scienze della Terra, Università di Firenze, Italy; [5]University of Vienna and Natural History Museum, Vienna, Austria.

Introduction: Muong Nong-type tektites differ from common splash form tektites by being larger, with irregular blocky shape, having a layered structure, being chemically heterogeneous, and (in some cases) containing undigested precursor minerals. Usually, dark layers are less abundant and, in thin section, they seem embedded in a light-colored matrix. Systematic chemical and physical variations are observable between dark and light colored layers. In particular, light-colored layers display a relatively higher Al and Fe content and a lower Si content with respect to dark layers. Moreover, the light layers have a higher refractive index (see [1] and references therein for a more complete description of Muong Nong-type tektites from the Australasian tektite strewn field).

Previous unpublished XANES data (collected on powder samples obtained by hand-picking separation of dark and light layers) showed small but detectable differences in the Fe oxidation between dark layers and light layers, the former being slightly but reproducibly more oxidized.

A new set of data has been acquired with an X-ray micro-beam on thin sections of 2 Muong Nong-type indochinite samples across the boundary between a dark layer and the light matrix in order to confirm whether or not there are systematic variations of the Fe oxidation state across the layers in the Muong Nong-type tektites. Moreover, 2D maps were collected to show qualitatively the spatial distribution of the Fe oxidation state..

Experimental: The XANES data and 2D XAS maps have been collected at the ID26 and BM08 beamlines respectively (ESRF, Grenoble, F) using a Si (311) monochromator (beam size at the sample of 55 x 120 µm for XANES and 200 x 200 µm for the 2D maps). Background subtracted pre-edge peaks have been fitted with sums of two to three pseudoVoigts components according to the procedure described in [2-3].

Results: Experimental XANES spectra are similar to those of other tektites [2,4,5]. However, reproducible changes occur in the pre-edge peak centroid energy of both samples: spectra collected within the dark layer display a pre-edge peak reproducibly ≈0.2 eV at higher energy than spectra collected within the light matrix. This difference in energy position is >4 times the estimated energy reproducibility and, therefore, is significant. We estimate the $Fe^{3+}/(Fe^{2+}+Fe^{3+})$ ratios in the light matrix and dark layer of the 2 studied samples to be 5 % and 15 % (±5), respectively. Moreover, XRF maps collected for one sample at selected X-ray energies (7400 and 7105 eV and the two pre-edge peak maxima at 7112 and 7114 eV ca.) were used to elaborate maps displaying spatial variations of the pre-edge peak shape related to the Fe redox state. Despite the very small differences in the Fe redox state between dark layers and light matrix, the features present in the maps roughly reproduce the shape and position of the dark streaks, confirming that in the dark streaks Fe is slightly more oxidized than in the light matrix.

References: [1] Koeberl, C. (1992) *Geochimica et Cosmochimica Acta*, 56, 1033-1064; [2] Giuli G. et al. (2002) *Geochimica et Cosmochimica Acta*, 66, 4347-4353; [3] Giuli G. et al. (2011) *American Mineralogist*, 96, 631-636; [4] Giuli G. et al. (2010) *Geological Society of America Special Paper* 465, 645-651; [5] Giuli G. et al.(2010) *Geological Society of America Special Paper* 465, 653-660.

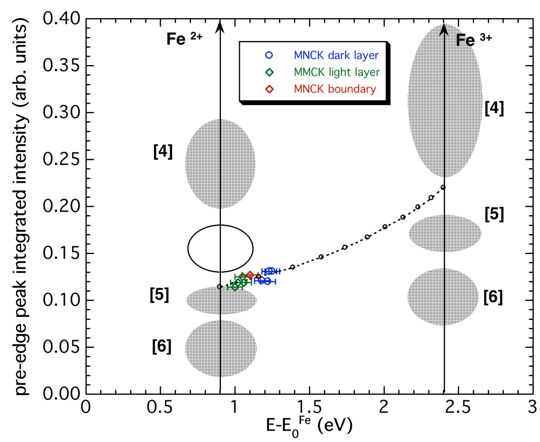

Fig. 1: pre-edge peak integrated intensity vs. centroid energy obtained from Fe K-edge microXANES spectra along a transect through the boundary between a dark streak and light matrix.