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μSYXRF Analysis on Tektites (Spherules) from K/T-Transitions - Link to the Chicxulub Crater

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Microtektites and glass droplets (of some 100 μm in diameter) produced by the impact of the Chicxulub meteorite were found around the Gulf of Mexico and in Central America. From microprobe studies, which we carried out as pre-investigations to the μSYXRF measurements we know that many of the micro-tektites show "Melt-Schlieren" and Ni-rich 10-20 μm sized spinel- inclusions, which are possibly of primary origin. The space resolved non-destructive determination of trace elements in smectite, glass spherules and inclusions from K-T sections by μSyXRF enables to develop characteristic fingerprints and to link the spherules to their source materials inside the impact crater. Using the SYXRF microprobe at Beamline L/ HASYLAB and at the Fluo/Topo Beamline/ANKA the spatial distribution of trace elements in micro-tektites was determined including melt inclusions and phase transitions. Area scans and line scans were carried out at micro-tektites from four different K/T sections in Mexico and Haiti. Analysis from the Mesa-Juan Perez and from the Mimbral sections (NE-Mexico), reveal a completely different chemical composition than the Beloc and Bochil tektite glasses. At Mesa-Juan Perez, smectite spherules and extreme Fe- and Ca-rich spherules are observed. Several of the spherules contain bubble structure, which often are filled by secondary carbonates, but also with condensates from impact materials and some contain inclusions of primary carbonates with schlieren structures from the impact site. Trace elements distributions show strong zonations in spherules and characteristic trace element distribution patterns for the different phases. The primary material of the displayed spherule is partly replaced by diagenetic calcite but an inclusion of primary carbonate is present as well. The carbonate inclusion is enriched in Y (up to 35 μg/g) and shows maximum Sr concentrations, whereas the Sr concentrations of the secondary calcite are relatively low. Ziconium and Nb are

enriched along a belt surrounding the secondary calcite. This is an indication that the primary material of the spherule was partly displaced by the diagenetic calcite leading to an enrichment of immobile elements at the border of the secondary calcite. These results indicate that the proximal ejecta originate from different stratigraphic levels of the impact site (basement, evaporites, carbonatic and pelitic sediments). Based on microscopical trace element distribtion, "fresh" and altered parts of the spherules can be discriminated. The trace element patterns of the relatively fresh parts of the spherules will be linked to the materials discovered in materials from YAX-1 and UNAM-5 cores which have been drilled into the Chicxulub impact crater.