Search for the presence of meteoritic components in tektites

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Tektites were formed by hypervelocity impact events and collected from the four strewn fields (Australasian, North American, Central Europe and Ivory Coast). The source craters for three of the four strewn fields have identified; the Chesapeake Bay crater for the North American strewn field, the Bosumtwi crater for the Ivory Coast strewn field and the Ries Crater for the Central European strewn field. Detection of meteoritic component and identification of the type of impactor were attempted based on platinum group element (PGE) abundances, and Os and Cr isotopic compositions of tektites and impactite materials from the corresponding crater. Except for the Bosumtwi crater, the nature of impactor remains ambiguous. In this study, we determined PGE abundances of tektites collected from three strewn fields (Australasian, North American and Ivory Coast) in order to detect meteoritic component and identify the type of impactor.

One Ivory Coast tektite, one bediasite, eighteen Australasian tektites (two australites, one phillipinite and fifteen indochinites) were analyzed by INAA and ICP-MS. Powder tektite samples were irradiated two times with different irradiation periods at Kyoto University Research Reactor Institute. Around 5 g of each powder sample was taken for the determination of PGE abundances by using NiS fire-assay combined with isotope dilution and ICP-MS. The ICP-MS measurement was performed using an instrument, iCAP Qc, equipped with a collision cell.

Iridium abundances of Ivory Coast tektite, one bediasite, eighteen Australasian tektites are comparable to or lower than those of upper continental crust (UCC), impactites and target materials. Although these tektites have similar CI-normalized PGE abundances to each other, these CI-normalized PGE abundance patterns are different from those of UCC, impactites and target materials. Ruthenium/Ir and Rh/Ir ratios of these tektites are higher than those of UCC, impactites and target materials. Platinum and Pd are depleted compared with Rh in these tektites. CI-normalized PGE abundances patterns of these tektites could be explained by the incorporation of IC or IIIAB iron meteorites as impactor. Mixing of iron meteorite, and UCC or target materials could not explain Pt and Pd abundances in tektites. This is probably due to the fractionation of PGE during the impact process. Thus, possible explanation of non-chondritic PGE abundance patterns of tektites from these three strewn fields are 1) incorporation of iron meteorites as impactor or 2) fractionation of PGE during impact processes.

Keywords: tektite, platinum group element

