Meteoritic organics as a carrier of the oxygen isotope anomaly in the solar system

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It is generally accepted that Earth formed from building blocks that compose of metals, rocks, water and organics. The latter two are particularly important to characterize the surface of our planet covered by atmosphere, ocean, and lives, although their exact origins remain unresolved. The organic matter abundantly found in primitive meteorites may provide us precious clues to address this issue. Several pioneers [1-4] discovered that a tiny fraction of the meteoritic organics, opposed to the bulk of them which are likely homogenized by later planetary processes, may preserve primordial isotopic signatures acquired upon its birth in the space medium. The main target of this study is to search for the oxygen isotope anomalies among the meteoritic organics.

We report the detection of organic grains, extracted from an Antarctic carbonaceous chondrite Yamato-793495 (CR2), with the highest $^{17,18}O/^{16}O$ ratios ($\delta^{17,18}O_{SMOW}$~+500‰) [5] among all planetary materials besides the presolar grains. The isotopic composition is plotted in the O isotope diagram close to the slope-1 line, where the compositions for the planet-forming building-blocks are predicted to be plotted on, suggesting that the detected organic grain may represent one of the fundamental carriers responsible for the O isotope anomaly, i.e., the non-mass-dependent $^{17,18}O/^{16}O$ variations commonly observed among all available solid planetary materials. By the multi-isotope imaging analysis, we discovered that $^{17,18}O$ enrichments among the organics were correlated with ^{13}C enrichments. This correlation is naturally explained by the self-shielding effect of CO that occurred in a warm (>60 K) gas medium illuminated by UV light, such as the surface layer of the solar nebula.

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Isotopic and geodynamic implications of progressive magmatism in W. Anatolia (Turkey)

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In the Aegean region, complex geodynamic processes including subduction, continent continent collision, and back-arc extension occurred from the Eocene to the present time. In NW Anatolia (Turkey), the products of these events are widely exposed. During and after the closure of the Neo-Tethyan Ocean and progressive collision of the Tauride-Anatolide Platform with the Sakarya Continent, widespread magmatism occurred in NW Anatolia. This magmatism is manifested in a NW trending belt along the northern border of the Menderes Massif. Due to the complex geodynamic setting of this region, the exact emplacement mode of the granitoids is still a matter of debate.

In order to see whole progressive magmatic evolution of the Western Anatolia and to understand its tectono-magmatic position in the Aegean region, during and after the collision of the Anatolide-Tauride platform with the Sakarya Continent, magmatic associations from Eocene to Miocene time were examined and gathered together by detailed mapping, geochemical, isotopic and geochronological studies. According to our new results, the Eocene and Miocene granites are shallow seated bodies (4-7 km), granite-granodiorite and monzogranite in composition, and are I-type, calc-alkaline in nature. Their Sr-Nd-Pb-O isotopes are in line with derivation from lower-to middle crustal source lithology. It can be demonstrated that mantle to crustal assimilation during the magma generation played an important role. Within the emplacement natures and isotopic results of the Western Anatolian magmatic associations, considerable limitations are put forward regarding to previously suggested extensional related emplacement models. The magmatic associations in Western Anatolia were formed in two distinct separated phases; the first and the earliest phase resulted in progressive magmatism and formed the intrusive suites of the Western Anatolia during the Eocene- Miocene time long before the main extension phase started. The late phase is mostly associated with the extensional regime.