PGE abundances of several sediment samples

H. AMAKAWA[1], N. SHIRAI1[1], R. YAMAGUCHI[1], M. MINAKAWA[2] AND M. EBIHARA[1]

[1]Deparment of Chemistry, Graduate school of Science, Tokyo Metropolitan University, Tokyo, Japan (amakawa@comp.metro-u.ac.jp)
[2]National Research Institute of Fisheries Science, Kanagawa, Japan

The platinum group elements (PGE) include six transition metals, i. e., Ru, Rh, Pd, Os, Ir and Pt. Due to the nature of chemical partitioning, these elements are distinctively depleted in the crust. This facilitates the identification of impact of meteorites having very high PGE abundances on the earth surface. PGE are also utilized for testifying the late veneer accretion hypothesis. However, the behaviors of PGE on the earth, especially in the aqueous environment are not well documented due to the lack of data. The PGE concentrations of sediments could help us understand the behaviors of PGE during weathering, digenesis and transport in the aqueous environment. Here, we report the PGE concentrations of various sediments, including GSJ sediment samples and the "Fish Clay" samples, which were collected at the K-T boundary of Steve Klint, Denmark, determined by ID-ICPMS (an external calibration method for Rh) after nickel sulfide fire assay concentration. In most cases, we successfully determined all six PGE including Os and Rh.

The CI-normalized PGE patterns of the two Fish Clay samples show flat patterns with very high normalized values (0.01 ~ 0.01) compared with those of loess samples (<0.001), indicating the meteoritic origin. When we look into details, however, a slight Os depletion relative to Ir in the patterns is observed for both Fish Clay samples. Although, this feature is almost same as those of the Steven Klint samples, SK10, determined by Kyte et al. (1985) and Lee et al. (2003), the cause for such depletion is yet to be identified. All the modern river and marine sediments samples show high CI-normalized Pd and Pt values (0.002 ~ 0.02) with low CI-normalized Os and Ir values (0.0001 ~ 0.01), being similar to those for the loess samples. This fact suggests that the PGE in the sediments are mainly from crustal rocks.

Isotopic signatures of presolar silicon carbide of type Z

S. AMARI[1], E. ZINNER[1], R. GALLINO[2], AND R. S. LEWIS[3]

[1]Laboratory for Space Sciences and the Physics Department, Washington University, St. Louis, MO 63130, USA (sa@ & ekz@wuphys.wustl.edu)
[2]Dipartimento di Fisica Generale dell'Universita' di Torino, 10125 Torino, Italy (gallino@ph.unito.it)
[3]Enrico Fermi Institute, University of Chicago, Chicago, IL 60637, USA (r-lewis@uchicago.edu)

Presolar SiC grains are classified into several different populations based on their C, N, and Si isotopic ratios. Z grains are defined as having $10 < {}^{12}C/{}^{13}C < 100$, ^{14}N enrichments relative to solar, ^{29}Si depletions and ^{30}Si enhancements (Alexander, 1993; Gao and Nittler, 1997; Hoppe et al., 1997). They comprise up to 6% of the total SiC in meteorites, with their abundance increasing with decreasing grain size. Studies of Z grains provide us with information on nucleosynthesis in AGB stars as well as on Galactic chemical evolution. Parent stars of Z grains are believed to be low-mass, low-metallicity AGB stars (Hoppe et al., 1997) and their initial compositions represent compositions of the early Galaxy.

Among SiC grains from the Murchison KJG separate (average size: 3μm) (Amari et al., 1994), candidates of Z grains were located by ion imaging in the ims-3f ion microprobe and subsequent C and Si isotopic analysis with the NanoSIMS confirmed two grains to be Z grains (Fig. 1). Their Ti isotopic ratios are given in Fig. 2. All except the $^{50}Ti/^{48}Ti$ ratio of grain 415-3 are lower than solar, indicating an origin in low-metallicity parent stars. The $^{50}Ti/^{48}Ti$ ratios are positively correlated with the $^{30}Si/^{28}Si$ ratios ($\delta^{30}Si/^{28}Si$=201±6 and 392±6‰; $\delta^{50}Ti/^{48}Ti$=–66±25 and 276±26‰ for 249-1 and 415-3). During the third dredge-up, when material processed in the He-shell is brought up to the envelope of AGB stars, Si and Ti isotopic ratios in the envelope are expected to steadily increase and the largest increase is expected for $^{30}Si/^{28}Si$ and $^{50}Ti/^{48}Ti$ ratios. Thus the correlation reflects nuclear processes in the He-shell.

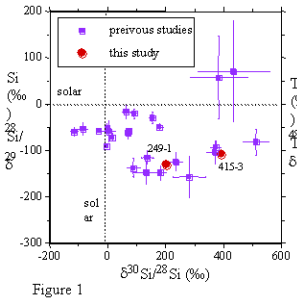

Figure 1

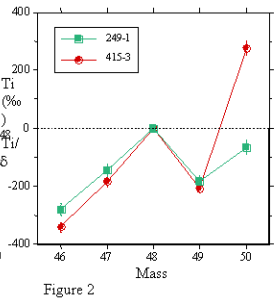

Figure 2

References

Alexander C. M. O'D. (1993) GCA 57, 2869-2888. Amari S., Lewis R. S., and Anders E. (1994) GCA 58, 459-470. Gao X. and Nittler L. R. (1997) LPC. XXVIII, 393-394. Hoppe P. et al. (1997) Astrophys. J. 487, L101-L104.