(i) Biogeochemistry of trace elements in the hydrosphere: Novel analytical methods are developed for trace metals and isotopes. Distribution of trace elements in the hydrosphere and its effects on ecosystem are investigated. The study also covers hydrothermal activity, deep biosphere and paleocene.

(ii) Ion recognition: Novel ligands and ion recognition systems are designed, synthesized and characterized.

Scope of Research

Publications


Presentations


Organic-inorganic Hybrid Adsorbents for Metal Ions Prepared by Ion Imprinting Synthesis, Umetani S, Meeting of the Union of Materials Engineering, Science Council of Japan, 19 October 2009 (keynote).

Grants


Sohrin Y. Development of Precise Isotopic Analysis for Founding Heavy Stable Isotope-Marine Chemistry, Grant-in-Aid for Scientific Research (B), 1 April 1 2009–
Ocean Section of Dissolved Zr, Hf, Nb, Ta, Mo and W in the Southern and South Pacific Ocean

Ocean sections of trace elements and isotopes (TEIs) are important for understanding their geochemical cycles, anthropogenic contamination, and effect on ecology and global climate. Zr, Hf, Nb, Ta, Mo and W are adjacent metals in the periodic table. Their marine geochemistry is still poorly known. We are now studying the full-depth ocean sections of dissolved Zr, Hf, Nb, Ta, Mo and W along 170°W in the Southern and South Pacific Ocean. Seawater samples were collected during the KH-04-5 cruise of R/V Hakuho Maru (November 29, 2004 to March 22, 2005). By analyzing a large number of seawater samples (more than 250 samples from 12 stations), we are discovering the first meridional section of TEIs throughout ocean basins.

In general, Zr and Hf increase with depth (Figure 1). Nb and Ta show depletion in surface water (0–300 m depths) and enrichment in bottom water. The concentrations of Zr, Hf, Nb and Ta in surface water are higher at stations in the Southern Ocean than at the northern stations in the South Pacific Ocean. In deep water (2000–4000 m depths), Zr, Hf, Nb and Ta show gradual increase toward northern stations, coincident with the flow of seawater by global thermohaline circulation. Mo and W show uniform concentrations, regardless different water masses and ocean basins. Based on these findings, we are going to develop a new model of trace metal cycling in the ocean.

Figure 1. Full-depth ocean section of dissolved Zr, Hf, Nb, Ta, Mo and W in the Southern and South Pacific Ocean.

References:

31 March 2012.

