

## ***In-situ* arsenic speciation in Earth surface environments: Importance of iron oxides**

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Contamination of aquifers by one of the most toxic forms of arsenic, As(III), is an important health concern in many parts of the world [1]. Recent studies have revealed that intimate relations exist between As and Fe cycling in Earth surface environments: microbial reduction of As(V) and Fe(III) is thought to be responsible for large-scale contamination of aquifers by As(III) in Southeast Asia [2,3,4]; in contrast, microbial oxidation of As(III) and Fe(II) leads to efficient water decontamination, especially in acidic environments [5]. Further modelling of As transformations partly suffer, however, from the scarcity of data addressing molecular-level speciation in field samples.

In this context, we have compared *in situ* speciation of As in natural and impacted soils, by combining XANES and EXAFS spectroscopy with selective chemical extractions. Our results indicate that As mainly occurs as surface complexes on iron oxides [6]. The relative importance of phyllosilicates as arsenic sorbents is generally difficult to evaluate in soils. It may, however be responsible for an increase of As(III) mobility [7], especially in iron-depleted anaerobic media.

Recent investigations of acid mine drainage [5] and geothermal springs [8] revealed similar coupling between arsenic and iron chemistry in these acidic environments. In both contexts, microbial oxidation of Fe(II) and As(III) leads to the formation of amorphous As(V)-Fe(III) hydroxysulfate compounds with similar local environments of As(V) and Fe(III). Importantly, the solubility of these compounds decreases with increasing Fe/As ratio. Frequently associated with biological substances, such compounds could be considered as potential markers of microbial activity in acidic environments.

### **References**

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## **High-silica magmatism in an oceanic core complex from the Central Indian Ridge**

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### **Introduction**

An oceanic core complex located at 25°S (25 °S OCC) of the Central Indian Ridge (CIR) was explored by SHINKAI 6500 of the Japan Marine Technology Center. Serpentinized peridotites and gabbros were collected with metamorphosed/altered basalts from the OCC. Highly deformed rocks of variable origins including peridotite and gabbros were also collected on the top surface of the OCC. These characteristics support that the OCC is a tectonically exposed deep-seated rock on the sea floor. Plagiogranite was recovered from the 25°S OCC. Quartz-bearing granitic small veins crosscut a gabbro. Origin of plagiogranite is still in debate (Koepke *et al.*, 2007). We report petrology and chemical compositions of plagiogranites in the CIR.

### **Results and discussions**

The plagiogranite in this study consists of fine grains of quartz and sodic plagioclase with small amount of amphibole, epidote including allanite, apatite and zircon. Geochemical characteristics of the plagiogranite are extremely high in SiO<sub>2</sub> content (80 wt. %) and low TiO<sub>2</sub>, FeO<sup>total</sup> and P<sub>2</sub>O<sub>5</sub> contents. Chondrite-normalized REE pattern of the plagiogranite is characterized by high REE abundances with conspicuous negative Eu anomaly, indicative of very high degree of fractional crystallization. In addition, convex (M-type) tetrad effect is clearly recognized in the sample, implying unusually volatile-rich (e.g., H<sub>2</sub>O, CO<sub>2</sub>, Li, B, F, and/or Cl) parent magma of the plagiogranite (Nakamura *et al.*, 2007). These characteristics suggested that plagiogranite was formed by either interaction with an external fluid originated from seawater or hydrous partial melting of pre-existing rocks in the initiation of amagmatic opening related to intermediate-spreading ridge.

### **References**

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