Bacteria-like texture of the Kuga iron meteorite and its synthesis

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Introduction

Mineralized fossils are found in meteorites and rocks of the Earth as quenched processes [1,2]. The main purpose of the paper is to elucidate detailed location of mineralize fossil texture in the Kuga iron meteorite.

Bacteria-like textures in the Kuga iron meteorite

The Kuga iron meteorite found in Kuga, Yamaguchi, Japan shows two bacteria-like textures of akaganeite mineral with Fe, Ni and Cl-rich composition, as two sizes of 10μm spherule-chains and small spherule chains in 100nm in size around only its fusion crust [3,4,5,6].

Comparison with Martian nano-bacteria texture

Similarity of bacteria-like texture of the Kuga and the ALH84001 meteorites is its composition (except Ni) and texture of small sizes. Main Difference of these textures is no carbonates minerals in the Kuga meteorite and synthetic textures of dynamic processes [3, 4]. Therefore, Martian texture requires any Ca-sources on the Mars.

Summary

Spherule-chained or bacteria-like texture of akaganeite composition has been found at the fusion crust of the Kuga iron meteorite found in Yamaguchi, Japan, and synthetic materials in author`s laboratory. Bacteria-like texture in the Kuga iron meteorite is different with that in the Martian meteoriteALH84001 required any sources of Ca and Mg elements on Mars.

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Fluid-sediment interactions in a marine shallow-water hydrothermal system at the Wakamiko submarine crater, Japan

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Marine shallow-water hydrothermal activity was discovered at the Wakamiko submarine crater at 200 meters water depth in Kagoshima Bay [1][2]. During KT08-9 expedition using R/V Tansei-maru, we collected sediments (up to 200 to 330 cm) using a piston corer from the crater. We studied mineralogy of the sediments using XRD, together with geochemistry of the pore fluids, to discuss hydrothermal alterations within sedimentary layer.

In the sediment successfully collected in the vicinity of the most active field (T = 200°C), smectite was dominant. Based on the 060 reflection intensity, dioctaheral smectite was found all over the core except for the surface, while trioctahedral smectite was found only in sediment from 270 to 300 cmbsf. Within this layer, relative amount of the triocatahedral smectite gradually increase downwards in replacement of the dioctahedral smectite decrease. Profiles of the pore fluid chemistry indicated that this layer corresponds to the boundary between sediment occupied with pore fluid of seawater composition (from 0 to 270 cmbsf) and of the hydrothermal component (from 300 to 330 cmbsf). These results suggest that the trioctahedral smectite was transformed from the dioctahedral smectite that had been formed prior, under the condition where high temperature was supported by the hydrothermal component intrusion and Mg was supplied by seawater.

In the sediment probably collected from another active hydrothermal field, kerolite (hydrated and highly disordered form of talc) was dominantly found below 220 cmbsf. Since chemical profiles of the pore fluid indicated that this layer (from 220 to 230 cmbsf) is occupied with the hydrothermal component, the kerolite is attributed to be formed by hydrothermal alteration.

[1] Ishibashi *et al.* (2008) *JGVR*, **173**, 84-98. [2] Nakaseama *et al*. (2008) *Resour. Geol.*, **58**, 289-300.