CHARACTERISTICS OF FINE BACTERIA-LIKE TEXTURE FORMED BY IRON METEORITE BY ATMOSPHERE REACTION. Yas. Miura, Yamaguchi University, 1677-1 Yoshida, Yamaguchi University, 753-8512, Japan (dfb30@yamaguchi-u.ac.jp)

Introduction: Spherule texture can be formed in dynamic reaction during any meteoritic impact in air. However, there are no reports on nano-bacteria-like (i.e. spherule-chained) textures with iron (and Nickel) oxides (with chlorine) in composition and micro-texture with 100nm order [1, 2, 3] in iron meteorite. The purpose of the present study is to show spherule-chained texture with micro-texture of 100nm in order found in the Kuga iron meteorite, Iwakuni, Yamaguchi, Japan.

Fine bacteria-like textures in the Kuga meteorite: The Kuga iron meteorite found in Kuga, Iwakuni, Yamaguchi, Japan reveals spherule-chained texture with Fe, Ni-rich composition with 10μm in size, where each spherule contained "long micro-texture in 100nm in size" (Fig.1) [1, 2, 3]. The complex texture of flow and chained shapes can be found in the fusion crust of the iron meteorite formed by quenched and random processes with vapor-melting process in air of the Earth. The FE-ASEM with EDX analyses by an in-situ observation indicate that the matrix of the spherule-chained texture with Fe, Ni, O-rich (with minor Cl) composition is carbon-rich composition formed by impact reactions in air.

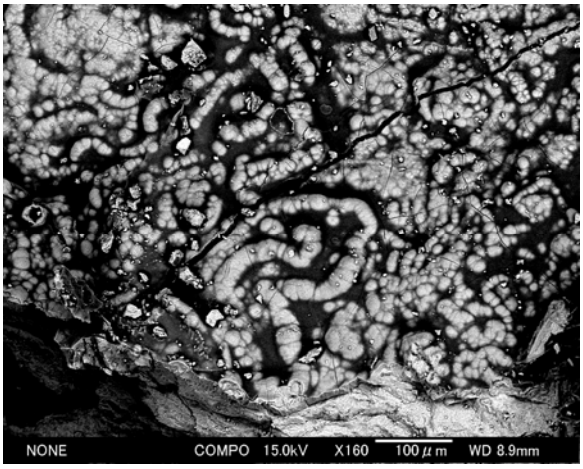

Figure 1. Electron micrograph (FE-SEM) of Fe-Ni-Cl-rich texture with spherule-chained and long shapes in the Kuga iron meteorite found in Kuga, Yamaguchi, Japan [1, 2, 3].

Comparison with Martian meteorite: Remnant of life in ocean can be found by mineralized fossil, which can be found in the Martian meteorite ALH84001 as bacteria-like chained texture of magnetite in composition (in 100nm order) around carbonate spherules [1, 2, 3]. Similarity of bacteria-like texture of the ALH84001 compared with the Kuga iron meteorites in this study are composition of Fe-rich, C-bearing, and chained texture of small size replaced by Fe and O-rich composition in air. Major difference of these textures is no carbonates minerals in the Kuga iron meteorite [1, 2, 3] compared with Martian bacteria texture as listed in Table 1. This indicates that impact reaction with iron meteorite and atmosphere cannot form double-staged textures of Fe-O fossils and carbonates spherules of Martian meteorite ALH84001 [4].

Table 1. Main characteristics of fine-bacteria texture of the Kuga iron meteorites [1, 2, 3].

1) Fine-spherule chained texture: 10μm in size
2) Nano-bacteria texture: 100nm in order
3) Fe, Ni-rich, C, Cl-bearing grains: Akaganeite-like composition (grain) and C-rich (matrix).
4) No carbonates: Few carbonate formation without Ca or Mg source from the Kuga iron meteorite.

First synthesis of Kuga bacteria-like akaganeite texture: A bacteria-like texture of Fe oxides (with minor chlorine as akaganeite-like compositions) can be synthesized by chlorine and water fixings on iron plates at author's laboratory [1, 2, 3].

Summary: The present results can be summarized as follows:

1) Spherule-chained texture of nano-bacteria grains with Fe, Ni, C and Cl can be found at the fusion crusts of the Kuga iron meteorite found in Japan, which are completely different with double stages textures of the Martian meteorite ALH84001.

2) Bacteria-like texture of the Kuga iron meteorite is significant example to form fine nano-particle similar with fossil-like texture.

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