Model of Material Characteristics of Carbonaceous Meteorites from Texture of Carbon-Bearing Grains

Yasunori Miura
Faculty of Science, Yamaguchi University, Yoshida, Yamaguchi, Yamaguchi, JAPAN

Introduction: Carbonaceous meteorites are unique meteorites in the extraterrestrial rocks. In this study author reports proposed model of previous unknown characteristics of *hard samples with voids*, *carbon-bearing texture*, *Ca-Al-rich grains* (with H, C, S) and detailed model of *carbon-bearing grains* in the carbonaceous meteorite which are applied to the Hayabusa samples as the present purpose here.

Characteristics of Carbonaceous chondrite: Carbonaceous chondrites contain ususally Ca and C elements (with Mg, Na ions and H_2O molecules), where these ions can form molecular *gel (polymer)* and *amorphous* (poorly crystallized Emblyo-type of *carbonates* (calcite and aragonite in mineral crystal). This suggests that extraterestial Celestial body is started as 1) *Ordinary chondrite-type micrograins* and *intercluster pores* (as less 2nm) followed *gel pores* (2 to 20nm in size) without carbonated calcium silicate matrixes, and 2) *Carbonaceous chondrite-type micrograins* show Ca-modified silica *gel clusters* mixed with *amorphous calcium carbonates* (ACC) with pores (4 to 10nm) as shown in Table 1. This model can be explain why the meteorite shows *porous rocks* and *harder rock* (than normal porous crystalline rocks with light weight). These gel to amorphous grain can be formed in present laboratory and industrial application as *Ca-Al-rich grains* (with H, C, S) as low *carbon binders.* This is just by accident in natural meteorite field academically because author has been investigated carbon origin and its application in science filed (including the AMS carbon dating projects) used in terrestrial age of the Antarctic meteorites (also in the Apollo samples as its carbon origins), and recent project of carbon and *carbon dioxides gas fixing* by dynamic processes (as the public University project). If it can be confirmed in science filed, then we can apply that *carbonceous meteorites* (and Moon rocks) has similar texture to fix carbon (or carbon dioxides) by its sources and development of its *extraterrestrial rocks* (model of grains of ions-gel polymer-amorphouse calcium carbonates as shown in Table 1, followed clear calcite crystal as in water planet Earth finally). This can be applied it also to decrease the *climate warning* scientifically and inductrially (as well-known Japanese scientist indicated by calculated estimates from global environmental data). The paper is dicussed it as material data with proposed model in the Hayabusa Symposium in Tokyo.

Table 1. Proposed model of micro-grains with pores from of the Solar System.

Meteorite variety	Micro-structure
1) Ordinary chondrite	Micro-grains and inter-cluster pores (as less 2nm), gel pores (2 ~ 20nm in size) (less carbonated calcium silicate matrixes)
2) Carbonaceous chondrite	Micro-grains with Ca-modified silica gel clusters mixed with amorphous calcium carbonates (ACC) with pores (4 to 10nm)

Summary: Author proposes model of hard samples with voids, carbon-bearing texture, Ca-Al-rich grains (with H, C, S) and carbon-bearing grains in the carbonaceous meteorite (also including the Hayabusa samples).

References:

Miura Y., Comparative consideration of Earth's mineral from three major events: Solid formation of other Celestial bodies, JAMS-2021 (Hiroshima Univ.), R5-01, 2021.

Miura Y., Carbon and carbon dioxides gas fixing by dynamic processes, Publication of JP5958889B2 (Active to 2028), 2016.

MiuraY. and Tanosaki T., Characterization of products from the nuclear and fire-electric facilities (in Japanese), University Report (Yamaguchi, Japan), 1-64, 2009.

Miura Y. , Material evidence for compositional change of dusts by collision applied to the Solar System's formation and the Asteroid belt. The ASP Conf. Series, 63, 286-288, 1994.

Miura Y. and Kato T., Shock waves in cosmic space and planetary materials. American Institute of Physics (AIP) Conf. Proc., 283 (Earth and Space Science Information Systems), 488-492, 1993.

Smith D.G.W., Miura Y. and Launspach S., Fe, Ni and Co variations in the metals of some Antarctic chondrites. Earth and Planetary Science Letters, 120, 487-498, 1993.

Miura Y., Computer simulation of anomalous composition of Mg-Fe plagioclase in meteorite. Mem. Natl Inst. Polar Res., Spec. Issue (NIPR, Tokyo), 35, 210-242, 1984.