LOCAL FLUID-INDUCED SHOCKED IMPACTS TO FORM ROCKS- AND FOSSIL-LIKE TEXTURES.

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Introduction: Fluids with water and carbon dioxides can be produced as local fluids or global water system of water-planet Earth. The former local fluids can be formed everywhere in the Solar System if there are rocks with the constituent elements of hydrogen, oxygen and carbon triggered by impact collision processes [1-5]. New method to produce rock-mineral macro-texture and round fossil-like micro-texture with material state-change is discussed by fluids-induced impact collision processes, which might be produced by laser-beam method as main purpose in this study.

Two types of fluids-formation processes: In order to produce two types of micro-textures with main breaking (with high pressure) and main melting (with high temperature), the laser-beam sputtering method [3] has been applied on targets of carbon-bearing calcite carbonate and carbon fiber as follows (shown in Figs.1 and 2) [1-5].

1) Mechanical breaking texture (with higher pressure) on target of carbon-bearing calcite carbonate (within water) shows linear micro-grains or minerals (10-100μm in scale) with linear nano-grains (10-100nm in size) as minor remained-products.

2) Fluidal melting texture (with high temperature) on calcite target (within water) reveals irregularly solidified micro-texture (10 to 100μm in scale) and nano-grains or minerals (10 to 100nm in size) as major remained-products.

3) The present result of impact on carbon-bearing carbonates indicates that round fluids-solidified (fossil-like) nano-texture has been obtained in highly cracked walls (in Fig.1), and that rock texture with remained phenocryst-like grains and melted matrix of groundmass [6] has been obtained in high temperature process relatively in this study [4, 5].

4) On wet carbon-fiber target, similar mechanical breaking texture (with higher pressure, and within wet air condition) is obtained as linear micro- to nano-textures with round fossil-like shapes (10-100μm to 10-100nm in size) as remained-products [4, 5].

5) On dry carbon-fiber target (in vacuum), irregularly cracked nano-texture (10 to 100nm in size) has been formed without any chemical contamination [4, 5].

6) The present impacts on carbon-fiber target (wet and dry) indicates that round fluids-solidified (fossil-like) nano-texture has been obtained in highly cracked walls with minor mixed chemistry only on "wet air" condition, not on vacuum condition (as shown in Fig.2).

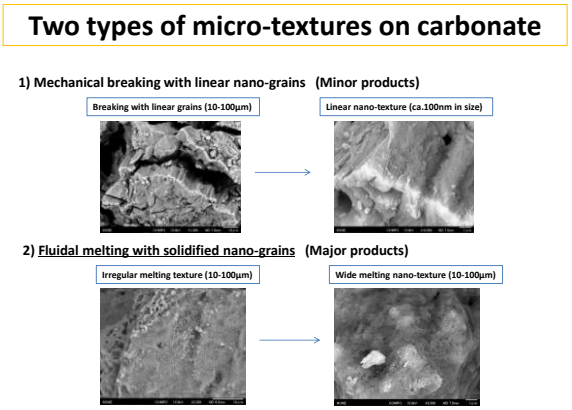

Fig. 1. Electron-micrographs of two types (breaking and melting) of micro- to nano-textures on carbon-bearing carbonate target by laser-beam method [3-5].

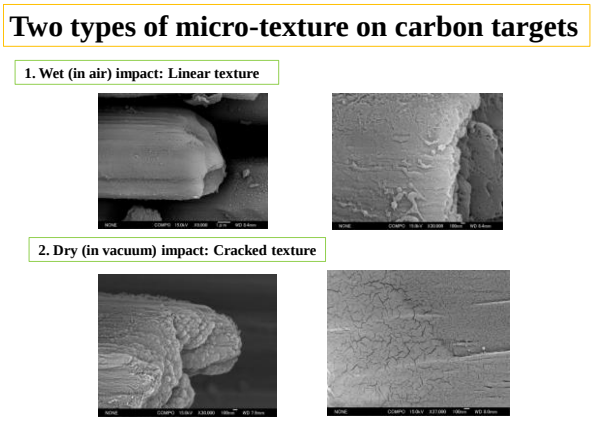

Fig. 2. Electron-micrographs of two types (breaking and cracked) of micro- to nano-textures on carbon-fiber target by laser-beam on wet (in air) and dry (vacuum) conditions. [3-5]. Round fossil-like nano-textures can be obtained by high shocked (without high temperature melted) with wet air conditions in this study (not by melted carbonate or dry carbon fiber).

Formation of rock (grain-matrix) texture: On the present laser-beam impact experiments, rock-like texture with grain (crystalline phenocryst) and groundmass matrix (solidified melted parts among grains) [6] has been obtained only high temperature (less high pressure) on complex composited target of carbonates (not in simple chemistry of carbon fiber) as follows (as shown in Fig.3) [3-5]:

1) Volcanic rock texture of phenocryst and groundmass formed by Earth's volcano has been formed by artificial shock-wave process of laser-beam technique in this study, which suggests that "meteoritic impacts" make similar volcanic rock texture in extraterrestrial celestial-bodies (the Moon, Mars and asteroids etc.).
2) Present laser-beam sputtering technique produces "local fluids" (from solid target rock) to fixed broken grains reserved as solidified groundmass, which is correspond to volcanic gas and fluids during volcanic process.
3) Fluids are formed instantly by shocked meteoritic imapacts (formed by laser-beam method), together with natural volcano and earthquake events locally.
4) Carbon element with exceedingly higher boiling and melting points of all volatile elements can form mixed material states of the vapor-liquid-vapor (VLS) system.

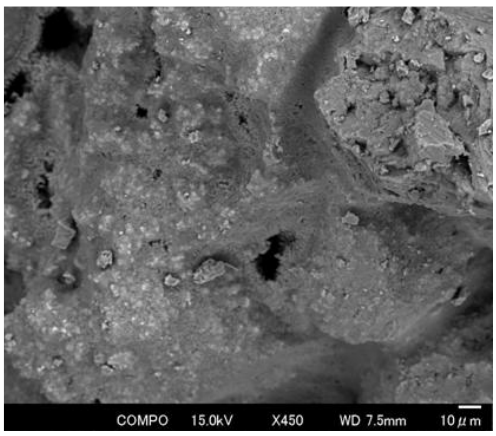

Fig. 3. Electron-micrographs of volcanic rock-like texture with phenocryst grains and melted solidified groundmass by the laser-beam method [3-5], which can be formed only by high-temperature melted condition in this study [1-5].

Formation of fluids for active life processes: Earth's life problem is discussed in this study from material-state system with fluids as follows [1-5]:
1) Earth's life (including human kinds) called as "mini-Earth" [1-5] is material-state system of vapor-liquid-solid (designated as VLS) states including local fluids, which are difficult to produce globally on any fluids (water)-deficient celestial bodies if it's no global water system (defined as Earth's global water).
2) Local fluids can be formed at any shock-wave process of meteoritic impact, quake and volcano events. Asteroid impacts can be produced everywhere in the cosmic space with local fluids, but without continuous regularity for longer periods and wide space. Quakes (including Earth-, Moon- and Mars-quakes) produce fluids during their activity but irregular supply in the wide interior sites with local and short gas and fluids. Volcanos are the only surface-interior events to produce volcanic rocks with three VLS material states, but with less periodicity at longer time and wide interior.
3) At large Earth planet system with global VLS states, smaller life might duplicate from large Earth system, and from local shock-wave systems of impact, quake and volcano with three VLS material system irregularly produced for long history.
4) Therefore, site of life's birth is not clear on active water-planet Earth, but significant consideration in this study might be how to copy three VLS states system (including local fluids) during active planet. The present results might point out that carbon system will duplicate fluids-formation from Earth's activity of three shock-wave processes of impact, quake and volcano on active planet of global-water Earth.
5) Extraterrestrial life activity is shown in this study that global to local fluid formation sites are the most expected sites to be found, where life's carbon system are evaporated after the death to be replaced by solidified micro-fossil materials to be found later now.

Summary: The present study are summarized as follows:
1) New laser-beam technique has been applied in this study to form rock (phenocryst-groundmass) texture, and round fossil-like micro-texture with material state change including prompt fluids-water states.
2) Rock-like texture with melted groundmass is formed at melted condition on mixed carbonates. Round fossil-like texture can be formed only highly cracked wall in wet air condition in this study.
3) Earth's life (called as mini-Earth) is three VLS states system with carbon cycle (including local fluids) during active planet, by duplicating fluids-formation on Earth's activity of three shock wave processes of impact, quake and volcano of global-water planet Earth.
4) For possible extraterrestrial life, its activity sites are global to local fluid formation sites, with replaced to solidified micro-fossil materials to be found later.

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