[EJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS07]Interface- and nano-phenomena on crystal growth and dissolution

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Recent developments of observations in nano-scale opened a detail discussion concerning mechanisms of crystal growth and dissolution based on interface phenomena including dynamics. In this session, growth and dissolution mechanisms of crystals will be discussed focusing on interface phenomena of minerals in the fields of biological origin, global environment, planets and space in addition to general minerals.

[MIS07-P02]Sublimation and regrowth of snow crystals observed by optical microscopes at Asahi-dake

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To understand characteristic properties of water and its phase transition processes via nucleation and subsequent growth, we performed in-situ observation experiment using real snow crystals at the base of Asahi-dake in the Taisetsu area, Hokkaido, Japan. We stayed there 11 nights in total for four winter seasons from 2015 to 2018 and observed sublimation and regrowth processes of snow crystals using originally designed experimental systems; the Maki-type laser interferometer (modified Mach–Zehnder-type interferometer), the Michelson-type white-light interferometer microscope with a long working distance, the optimized color-filtered optical microscopes, a polarized optical microscope and so on. We also prepared an environment controllable cell using a Peltier cooling unit, which has a water vapor source with a heater and a chromel-alumel thermocouple, windows for optical observation, capillary to handle a snow crystal and a platinum resistance temperature detector for temperature measurement of the cell.

At first, we make one or two igloo-like snow laboratories (snow-lab) and set up optical systems in the snow-lab. Typical ambient temperature in the Taisetsu area is around -10 to -20^{o}C and inside temperature of the snow-lab is slightly increased to be -5 to -11^{o}C due to experimental systems such as illumination lights, monitor and camera in addition to heat of active observers. The humidity has been naturally controlled close to 100% because all the walls of the snow-lab have been made of snow, which also works as a good sound and vibration absorber.

We collected snow crystals directly on a black felt just outside the snow-lab and selected a snow crystal, which was put onto a glass plate for general observations of the shape and surface textures or onto the tip of the glass rod smaller than 1 mm in diameter to observe rates for sublimation and regrowth at a certain environment. Interference fringes made using a reflection light from a surface of a snow crystal were successfully observe by the Michelson-type white-light interferometer microscope. In this presentation, we will report our attempts of in-situ observation and the results including temperature and humidity dependent rates of sublimation and regrowth of a snow crystal observed using

our experimental systems.

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