

液-液界面析出法による氷の結晶作製に対する磁場効果 IV

Crystallization of Ice by LLIP Method under Magnetic Field IV

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There are various shapes of ice crystal due to the environment of temperature, moisture and degree of supercooling. [1] We have reported previously[2], (1) the dendrite crystal is crystalized from the liquid-liquid interfacial precipitation (LLIP) method using toluene and butanol aq., (2) the crystallization speed of the dendrite is accelerated by a horizontal magnetic field, and (3) the position of the roots is biased toward low magnetic field. The magnetic field effects were recognized for the orientation and the size of C60 fullerene nano-whisker [3], and for the polymorphism of glycine crystal. [4] In this study, we developed a new *in situ* observation system to observe the 3D growth of the dendrite ice on the L-L interface under the influence of horizontal and vertical magnetic fields with/without the gradient magnetic field.

1mL of Butanol aq. containing 7wt.% water was stacked on 1mL of toluene to form the L-L interface in a glass made reactor with 10 mm ϕ . Then the reactor was set in the magnet bore of the magnetic field up to $B = 13$ T with the gradient at $T = -16$ °C. The top and side view movies by two CCD cameras were recorded for 3h. Figure 1 shows a top view shot of the dendrite ice under zero magnetic fields. Figure 2 shows a side view shot observed simultaneously. Nevertheless the dendrite ice was thought to grown in horizontal plane, a new information was recognized; the face was not in the horizontal but declined under absent and exist of the magnetic field. The growth rate and the direction against the magnetic flux and gravity, and the position of roots were estimated and the mechanism of the magnetic field effects on ice was discussed.



Fig. 1. Top view of the dendrite ice crystal observed under zero magnetic fields.

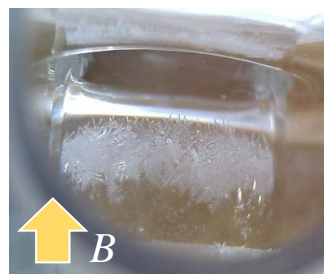


Fig. 2. Side view of the dendrite ice crystal observed in reduced gravity environment under vertical magnetic field of $B = 9.6$ T with $BdB/dz = 584$ T²/m.

Acknowledge

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References

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