第62回応用物理学会春季学術講演会 講演予稿集 (2015 東海大学 湘南キャンパス)

# Crystal Growth of NaCl by LLIP Method under Magnetic Fields II

◦Ryusei Semba, Ryosuke Yoshida, Taku Arashiro, Shun Ozawa and Isao Yamamoto

(Yokohama Nat'l Univ.)

E-mail: semba-ryuusei-rt@ynu.jp

There are three common methods to obtain a molecular crystal; evaporation, cooling and adding anti-solvent. To control the particle size and their distribution are difficult by using these methods. Recently, a new method has been suggested to control the size and morphology. The crystals obtained by the liquid-liquid interface precipitation (LLIP) method showed the increase and decrease under the influence of magnetic fields and change in the crystal structure [1, 2]. In this study the magnetic field effects were investigated for the ionic crystal NaCl [3].

A good-solvent for the material and an anti-solvent are layered in the method. The crystals are crystallized and grown on the interface, so they are continuously able to be grown. Using LLIP method, the special shaped crystals were precipitated. Fig. 1 shows NaCl crystals with concave step-wise made by LLIP method. On the other hand, fullerene crystals made by LLIP method are like whiskeres (FNWs). The size of FNWs was increased by 100 times under the strong magnetic field

Sodium chloride was crystallized by LLIP method under magnetic fields. The volume of 1.0 ml of water saturated with saline was put into a glass made reactor with a membrane filter laid on the bottom. 1.0 ml of 1-butanol was added gently to make the interface. The reactor was set in a bore of a horizontal superconducting magnet. The reactor was taken from there after 3 hours. The liquid in the reactor was disposed and the crystals on the filter were dried naturally for one day. Two neighboring sides of 100 crystals were measured by using SEM and each area was evaluated. The magnetic field effects was observed as shown in Figs. 2(a) and (b). The distribution tended to became broad and to shift toward large size when the horizontal magnetic field was applied.

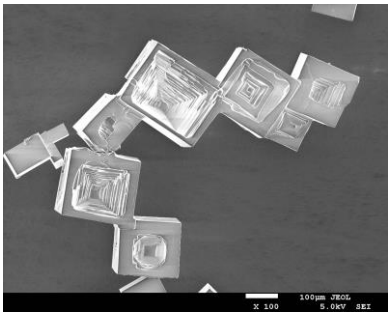
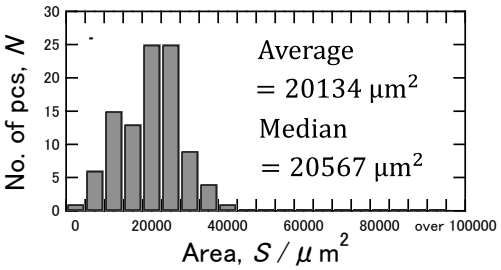
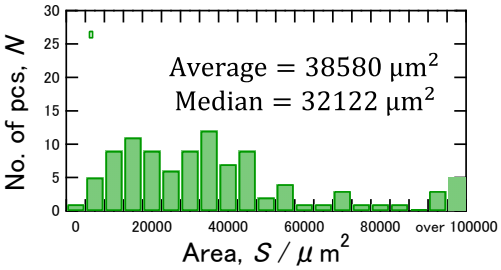


Fig. 1. SEM image of the concave step-wise NaCl crystals prepared by the LLIP method. The scale bar indicates 100 μm.




(a) $B = 0$ T




(b) $B = 8.0$ T

Fig. 2. Distributions of the areas of NaCl crystals precipitated in (a) a zero magnetic field and (b) the horizontal magnetic field of $B$ = 8.0 T after 3 hours.

References: [1] T. Arashiro *et al.*: JSAP-MRS Joint Symposia, 20p-F4-4 (2014). [2] I. Yamamoto *et al.*: MRS-J symposium, J19-010 (2013). [3] R. Semba *et al.*: JSAP-MRS Joint Symposia, 20a-F4-4 (2014).