

New Interpretation of NaCl Crystal Growth Rate for Operation and Design of Multiparticle Crystallizers

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Summary

Introduction

Phenomenon of NaCl crystal growth rate enhancement by the presence of micro-crystals has been measured and analyzed. In the previous studies, temporary generating of micro-crystals was considered, however, growth rate was not discussed under the conditions of a continuous slurry feeding. In the industrial crystallization, the crystals are produced under suspension conditions. In this study, while micro-crystals were fed continuously, growth phenomenon of a single crystal was observed and the growth rate was measured. The particle size distribution of micro-crystals was changed and the effect of this distribution on the growth rate enhancement was investigated, and the effect on the crystal quality was also discussed.

Experimental

Two different concentration solutions were supplied to a Y type micro-crystal generator. The particle size of micro-crystals was changeable by selecting the residence time θ_r after the mixing of two solutions. A NaCl single crystal was fixed in a growth cell, after feeding the clear solution without micro-crystals for about 2 hours, the feed was changed to the slurry containing the micro-crystals of voluntary sizes, and the slurry was fed continuously.

Results and Discussion

Growth Enhancement: A typical result of growth enhancement is shown in Fig.1.

Crystal Quality: While micro-crystals were fed continuously, inclusions were generated throughout growth of the single crystal.

Conclusion

As the results of continuous slurry feeding, the following conclusions were obtained. (1) The growth rate enhancement was not temporary but maintained during slurry feeding. (2) The inclusions were generated while the growth rate enhancement was continuing.

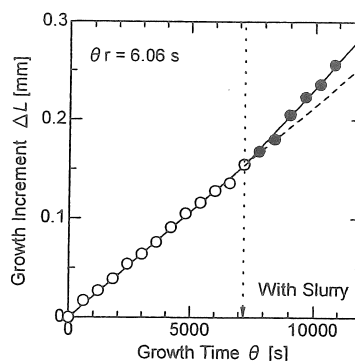


Fig.1 Growth curve during continuous micro-crystals feeding ($\theta_r=6.06$ s)