

Crystallization Behavior at Liquid-liquid Interface under an Electric Field

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Controlling chemical and physical properties of powder particles is very important in powder processes of chemical industry products. Crystallization is a conventional unit operation which is possible to control the particle morphology in the production process, and can be modified by external fields.

In our previous paper, morphology control was performed at liquid-liquid interface between a solution (NaCl aq.) and an anti-solvent (1-butanol). However, mutual diffusion at the interface, which induces supersaturated state, cannot be controlled well because it is determined by the combination of two solvents. Then, in order to control diffusion of the two solvents or nucleation as an operation parameter in the crystallization process, an electric field was utilized in this paper. The electric field affects chemical potential of solution molecules and precipitated particles.

Mass of NaCl crystals precipitated at each frequency and with operation time is shown in Figure 2. The mass of precipitation increased at all frequencies in comparison with the case without applying electric field at 150 s. The nucleation occurred frequently in a short time with applying AC electric field. In the mass of precipitation at 600 s, the nucleation is dependent on the frequency. Thermodynamic effect due to application of the electric field was considered in the promotion of nucleation and the frequency dependence.

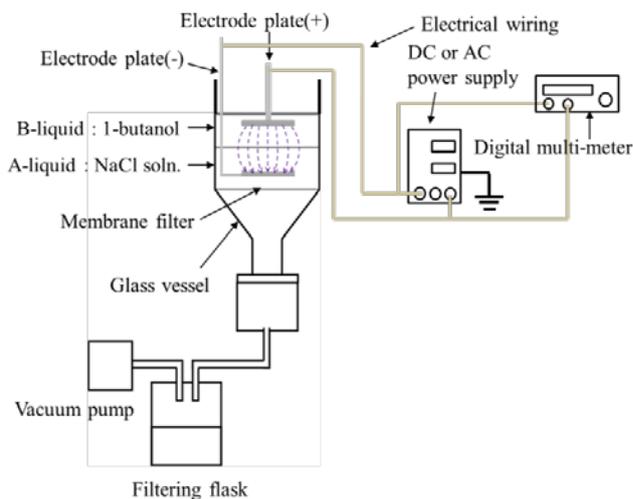


Figure 1 Experimental apparatus.

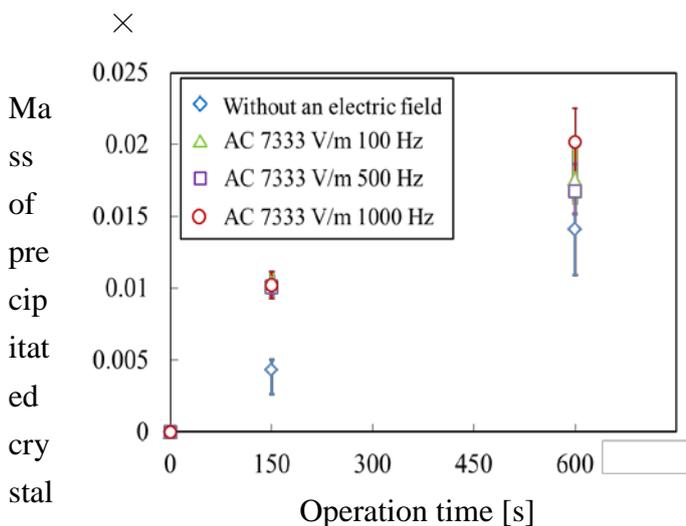


Figure 2 Mass of precipitated NaCl crystals.