

The production of an ice layer with high purity from wastewater

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Layer melt crystallization is used in purification of organics containing isomers, close boiling compounds and heat sensible materials for example. The concept of layer melt crystallizer is to form a crystalline layer internally or externally to its cooled wall, and to further purify the layer by elimination of impurity inclusions trapped during its growth. The purification of the crystalline layers obtained in layer crystallization has been carried out by a cooling rate, growth rate and sweating condition. The impurity distribution inside crystalline layer obtained in layer melt crystallization was explored experimentally for binary eutectic mixture of solvent and water. The crystalline layer was obtained at the cooling temperature of -7 , -10 , -15 , and -20°C , the organic content of $50,000\sim 200,000\text{ppm}$ in wastewater, and the cooling rate of 0.2 , 0.5 , and 1K/min . After crystallization, sweating operation was carried out for various crystalline layers obtained in crystallization. The application of sweating process leads to high purities. The purity of the product was described with the effective distribution coefficient K_{eff} . The impurity of crystal was removed one-step over (K_{eff} ranges 0.001 to 0.2).