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Investigation on nucleation kinetics, growth and characterization of urea oxalic acid –ferroelectric single crystal

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Abstract

Nucleation and growth kinetics renders the information about the crystal growth process, which can be adopted to grow large size crystals. Urea oxalic acid was synthesized by a slow evaporation method. Solubility was analyzed gravimetrically and it was observed that it exhibits positive temperature coefficient of solubility which is suitable for bulk growth. Metastable zonewidth was observed by adopting polythermal method. Induction period was measured by isothermal method for the saturation temperature by varying the degrees of supersaturation. Based on the classical theory of nucleation, the other nucleation parameters such as interfacial energy, Gibbs critical free energy and radius of critical nuclei were calculated. Urea oxalic acid (UOA) was synthesized and subsequently grown by a slow cooling technique. Single crystal X-ray diffraction study confirms that the crystal belongs to a monoclinic system. Dielectric analysis affirms the ferroelectric property of the material and the results were further discussed in detail.

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