Crystal engineering techniques for polar organic π-conjugated crystals

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We investigate various crystal engineering techniques for highly efficient electro-optic and nonlinear optical organic crystals in order to control the crystal growth characteristics including spontaneous nucleation, morphology and polymorphism. To obtain bulk crystals with high optical quality and optimized morphology suitable for photonic applications, polar π-conjugated organic crystals, configurationally locked polyene (CLP) and styryl methylquinolinium crystals are selected. The bulk crystals are grown by rapid and slow cooling method and slow evaporation methods. As-grown crystals exhibit acentric molecular arrangement with high order parameters ($\cos^3\theta_p$ = 0.69-1.0). Main supramolecular interactions are head-to-tail hydrogen bonds for CLP crystals and Coulomb interactions between cations and anions for styryl methylquinolinium crystals. We control the nucleation point, purity and morphology using various crystal engineering technics such as using single solvents and mixed solvents and introducing additives.