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Preferential enrichment (PE) is the first spontaneous enantiomeric resolution phenomenon that originates from regular chiral fluctuation or symmetry breaking and can apply to racemic crystals.^{1,2} The mechanism of PE has been interpreted in terms of a nonlinear complexity phenomenon including two unique processes: i) a solvent-assisted solid-to-solid polymorphic transition^{1,3} and ii) subsequent selective redissolution of the excess one enantiomer from the transformed disordered crystals into the mother liquor.^{1,4} Furthermore, recently we have demonstrated that PE is applicable to common racemic crystals if the four requirements based on the mechanism are satisfied.^{1,5}

Here I talk about the concept, properties, mechanism and requirements with respect to PE, particularly focusing on (1) the *in situ* XRD and microscopic observation of polymorphic transition,³ (2) the kinetic and thermodynamic origin of chiral symmetry breaking,⁴ (3) the ternary phase diagram consistent with the mechanism,⁴ and (3) the practical application of PE to the racemic crystals of common neutral or basic amino acids and chiral drugs, and their racemic cocrystals with achiral dicarboxylic acids, etc.⁵

References

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