IECP 2020

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Conference Proceedings Paper

Multi-Component Solid Forms of Organic Compounds

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Published: date
Academic Editor: name

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Abstract: Having started my career in pharmaceutical industry, my research focuses on the control and use of solid-state forms of API. The solid state of API has an important impact on properties of solid drug forms such as tablets, influencing hygroscopicity, biodisponibility. My research focuses on engineering the solid-state of API adding multiple components to the same solid phase. We showed how multi-component crystallization (co-crystallization) can be used to control the solid-state properties of drug compounds (hygroscopicity, melting point stabilization, …)[1] but can be used as well as to expand the patent life-time of a given drug.[2] In parallel, we also specialize in developing multi-component crystallization processes, upscaling it to the kg scale.[3] Doing so, requires a careful control of underlying thermodynamics and kinetics. In a final part of my research, we go one step further, using the specific properties of multi-component systems to develop novel crystallization-based applications. In particular my group has developed a novel type of resolution based on enantiospecific co-crystallization from solution.[4] We recently expanded this to resolve mandelic acid using preferential co-crystallization.[5] In our latest ground-breaking work, we used the underlying thermodynamics of these systems, to pull them towards a transformation of the racemate into an enantiopure drug in a so-called deracemization process.[6]

Keywords: Co-crystals

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