1. Record Nr. UNINA9910799218003321

Autore	Donoshita Masaki
Titolo	Design of Crystal Structures Using Hydrogen Bonds on Molecular-Layered Cocrystals and Proton–Electron Mixed Conductor / / by Masaki Donoshita
Pubbl/distr/stampa	Singapore : , : Springer Nature Singapore : , : Imprint : Springer, , 2024
ISBN	981-9970-62-8
Edizione	[1st ed. 2024.]
Descrizione fisica	1 online resource (XII, 79 p. 57 illus., 49 illus. in color.)
Collana	Springer Theses, Recognizing Outstanding Ph.D. Research, , 2190-5061
Disciplina	548
Soggetti	Chemistry, Inorganic Solid state chemistry Chemical bonds Supramolecular chemistry Materials - Analysis Condensed matter Inorganic Chemistry Solid-State Chemistry Chemical Bonding Supramolecular Chemistry Materials Characterization Technique Phase Transition and Critical Phenomena
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	General Introduction -- Rational Construction of Molecular Electron-conducting Nanowires Encapsulated in Proton-conducting Matrix in a Charge Transfer Salt -- Drastic Rearrangement of Self-assembled Hydrogen-bonded Tapes in a Molecular Crystal -- Various Stacking Patterns of Two-Dimensional Molecular Assemblies in Hydrogen-Bonded Cocrystals: Insight into Competitive Intermolecular Interactions and Control of Stacking Patterns -- General Conclusion.
Sommario/riassunto	This thesis addresses the design of crystal structures using hydrogen bonds. In particular, it focuses on the design of functionalities and the

control over the packing of molecular assemblies, based on molecular designs. Firstly, the synthesis and evaluation of a proton–electron mixed conducting charge transfer salt is reported. Focusing on the difference in the strength of hydrogen bonds and weaker intermolecular interactions, a system was rationally designed and constructed where electron-conducting molecular wires were encapsulated within a proton-conducting matrix. Next, the investigation of structural phase transitions in a cocrystal consisting of hydrogen-bonded two-dimensional molecular assemblies is reported. Drastic rearrangements of hydrogen-bonded molecular assemblies in the cocrystal led to single-crystal-to-single-crystal phase transitions, resulting in anisotropic changes in the crystal shape. Furthermore, chemical modification ofa component molecule in the cocrystal is reported. The modification afforded control over the stacking patterns of the two-dimensional molecular assemblies, i.e., sheets, and the mechanism was discussed considering the intersheet intermolecular interactions and molecular motion. It is suggested that hydrogen bonds are beneficial to construct molecular assemblies in molecular crystals because of their strength and well-defined directionality, and the consideration of coexisting weaker intermolecular interactions can lead to the design of whole crystal structures and, hence, functionalities. This thesis benefits students and researchers working on solid-state chemistry by presenting various methods for characterizing and evaluating the properties of molecular solids.