Furukawa Group Seminar

Date

Jul. 17th, 2025
13:30–14:30

Venue

Kyoto University, KUIAS
iCeMS Main Building

2F Seminar Room
(#A207)

Registration

· Required from Google form
(https://forms.gle/iUYcTeANobgAYUBk8)

· On-site only

Contact

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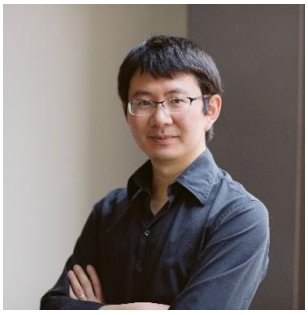
IOCF Zen-ichi Yoshida Lectureship

Hydrogen-bonded crosslinked dynamic crystals and supramolecular 3D printing materials



Prof. Chenfeng Ke

Washington University in St. Louis, USA
Department of Chemistry

Abstract

The development of hydrogen bonded cross linked organic frameworks (HCOFs) has paved the way for dynamic crystalline materials combining structural robustness with reversible adaptability. In this talk, I will discuss our design strategies for topochemically synthesizing single-crystalline HCOFs, highlighting their guest-induced elastic expansion and ability to maintain crystalline order through dynamic hydrogen bonding. Drawing inspiration from supramolecular gels and polyrotaxane networks, we have translated these dynamic motifs into printable inks suitable for direct-ink-write additive manufacturing. These supramolecular 3D printing materials leverage non covalent crosslinks to enable shear-induced flow during printing, followed by rapid network reformation for shape fidelity and mechanical integrity. We showcase applications ranging from moisture-responsive actuators, where a single hydrogel ink can yield distinct polyrotaxane networks simply by varying printing temperatures, to stimuli-responsive printed objects exhibiting shape memory and high mechanical properties. Our findings open avenues in smart materials for soft robotics, adaptive architecture, and responsive devices.