



KEMIJSKI INŠTITUT

PREDAVANJE / LECTURE

Dr. Thomas Douglas Bennett

University of Cambridge, UK

Ponedeljek / Monday, 22.5.2023 ob / at 10:00 / 10 am

Velika predavalnica / Great Lecture Hall

Kemijski inštitut / National Institute of Chemistry, Ljubljana

Looking Beyond Crystallinity in Metal-Organic Frameworks

Metal-organic framework (MOF) materials are often ordered, (crystalline) solids. Order—or uniformity—is frequently held to be advantageous, or even pivotal, to our ability to engineer useful properties in a rational way. Here, we will look at the difference between amorphous, and glassy solids, and cover the mechanisms underpinning the shear-induced collapse of MOFs. Using the crystalline MIL-100 / amorphous Fe-BTC pairing as an example, we will then address the poorly understood structure of the latter. Specifically, we show an experimental-computational approach to generate a 'structure' for Fe-BTC, and show it may outperform MIL-100 in terms of gas separation. We will demonstrate the several families of MOFs known to form stable liquids at high temperature, with quenching leading to the formation of glasses which retain the three-dimensional inorganic-organic bonding of the crystalline phase. These are a new category of glass, exterior to metallic, inorganic and organic species. The uses of such materials will be evaluated, before we finally show how the formation of composites containing both MOF, and glass phases may find use in applications.

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Vljudno vabljeni / Kindly invited