

Seminar Series on Bio-Soft Matter Out-of-Equilibrium (1)

Date: 1st. October, Tuesday

Place: Room #205, 2nd Floor, Science Building #1, The University of Tokyo

(東大、本郷キャンパス、理学部 1 号館 205 会議室)

Program

14:00-15:00 Francois-Genes Tournilhac (Matiere Molle et Chimie, ESPCI, France)

“Vitrimers, A New Class of Organic Networks”

15:00-15:30 Coffee Break

15:30-16:30 Kohzo Ito (Dept. Advanced Materials Science, The University of Tokyo)

“Topological Supramolecular Network with Entropy of Rings”

“Vitrimers, A New Class of Organic Networks”

Francois-Genes Tournilhac (Matiere Molle et Chimie, ESPCI, France)

Abstract: Chemically cross-linked polymer networks (elastomers and thermosets) have excellent mechanical properties and resistance to solvents, but they can not be recycled or remodeled once synthesized. In contrast, non-crosslinked polymers (thermoplastics) and those involving physical crosslinkings are thermally processable, but they are soluble. We design chemically crosslinked networks in which we make possible thermoactivated exchange reactions able to reorganize the network topology without changing the number of links and average functionality. The chemistry is based on hydroxy esters bridges made from ordinary epoxy resins. At high temperatures and in the presence of a well chosen catalyst, exchanges are fast and these networks are able to flow like a highly viscous viscoelastic liquid. They can then be shaped without help of a mold nor precise temperature control or even welded as is done for glass. The name "vitrimers" has been chosen by analogy with glass to reflect this similarity and the fact that as the glass in the inorganic world, they are an exception in the field of organic materials. Unlike all other glassy solids (organic or inorganic) whose viscosity varies abruptly near the glass transition, silica softens very slowly with temperature following a simple Arrhenius law. It is this unique feature that allows the glassworks. Vitrimers follow exactly the same law.

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