

## Search for polyamorphism and liquid-liquid transitions in polymers

Ayano Chiba

Department of Physics, Keio University, Hiyoshi 3-14-1, Yokohama 223-8522, Japan

Amorphous-amorphous or liquid-liquid transitions are now well known. These are transitions (or continuous transformations) between two disordered structures, and the concept of such polymorphism in disordered systems is sometimes called “polyamorphism”. The polyamorphism is originally suggested experimentally for ice in 1985, and now is well known to be seen in materials such as SiO<sub>2</sub>, phosphorus, and so on. The important point is that it is characterized by changes in static structure  $S(Q)$ . Here we did an in-situ search for a liquid-liquid transition in a polymer. High-pressure in situ x-ray diffraction and specific-volume measurements on isotactic poly(4-methyl-1-pentene) melt have uncovered abrupt changes in the pressure dependence of microscopic structure as well as that of macroscopic density. Although the change was found to be continuous, we found a clear change in the first sharp diffraction peak (FSDP) of  $S(Q)$ . In other words, we observed two kinds of structures in the melted state of this polyolefin; i.e., low-density melt and high-density melt. We also have started to investigate the possibility of amorphous-amorphous transitions for the same polymer and also of such polyamorphism for other polymers. We shall give a brief review on polyamorphism and show our recent results.