International Conference on

PLASTIC ENGINEERING & POLYMER SCIENCE

June 25-26, 2019 | Tokyo, Japan

Oriented recrystallization of carbon-coated pre-oriented ultrathin polymer films

Ma L[1] and **Yan S**[1,2]

[1]Beijing University of Chemical Technology Beijing, China

[2]Qingdao University of Science & Technology, China

The recrystallization behavior of carbon-coated pre-oriented polymer thin films was studied by means of transmission electron microscopy combined with electron diffraction and spectroscopy. It was found that vacuum evaporated carbon layer can keep the molecular chain orientation of pre-oriented polymer thin films. This demonstrates the existence of strong fixing effect of vacuum evaporated carbon layers on the surface layer of the polymer films, which prevents the relaxation of surface extended macromolecular stems in the crystals or at least from a complete relaxing during high-temperature melting. The fixed surface molecular chains have in turn induced the oriented recrystallization of the thin polymer molten layer. It was further found that the crystal structures and morphologies can be well controlled through regulating the crystallization temperature. For example, the α to β transition of has been achieved by melt recrystallization of carbon-coated highly oriented PVDF ultrathin films at atmospheric pressure. Moreover, through selective carbon-coating with the help of a mask and subsequent recrystallization of the pre-oriented polymer thin film lead to patterned structure control in the coated domains of a polymer thin film. A fully structure control can be fulfilled through a combination of surface carbon coating at desired domains and recrystallization on an oriented substrate with heteroepitaxy.

skyan@mail.buct.edu.cn