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Chain Fodling Patterns of Semicrystalline Polymer Fromed via Different Crystallization Pathways: Roles of Chain Network SHICHEN YUAN, TOSHIKAZU MIYOSHI, Univ of Akron — Crystallization of polymer chains has been a debatable matter due to a lack of experimental techniques to access chain-level structure during and after crystallization. Our group developed a novel strategy to trace chain trajectory of isotope labeled polymer chains by ^{13}C-^{13}C Double Quantum (DQ) NMR. *Isotactic*-polypropylene (*i*PP) shows polymorph depending on crystallization kinetics, and metastable mesomorphic and β forms experience phase transitions into stable α form via melting and re-crystallization by increasing temperature. In this study, we investigated chain trajectory of *i*PP in metastable crystalline forms obtained by rapid quenching, nuclear agent, stable α forms obtained via phase transition from metastable forms and quiescent crystallization from the melt. Comparing experimental DQ buildup curves with spin-dynamics simulation, it was revealed that β and mesomorphic forms adopt adjacent re-entry cluster with average folding number of 4-5, which are very close to that in the stable α form after phase transition and in the melt-grown crystals. The results indicate that available kinetics does not influence average folding number during crystallization, and that invariance of chain network dominate chain-folding process.

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