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**Short-Range Correlation of Successive Helical Jump Motions of Poly(L-Lactic Acid) Chains as Revealed by Solid State NMR**[1] WEI CHEN, TOSHIKAZU MIYOSHI, Department of Polymer Science, the University of Akron — Polylactide (i.e. Polylactic acid, PLA) is a renewable and biocompatible thermoplastic material, owning the largest market share among all biodegradable polymeric materials. Thus, understanding of microscopic structure and dynamics are definitively important subjects in further application. The helical jump motion in semi-crystalline polymers was proposed by Hoffmann et al to explain the $\alpha_c$ relaxation in the crystalline region. So far, solid-state NMR proved that several semi-crystalline polymers such as polyethylene, isotactic-polypropylene, etc, show large amplitude motions in the crystalline regions. Additionally, successive helical jump motions may lead to long-range chain diffusions. Actually, chain diffusions are determined in terms of combinations of the overall jump rates and coupling degree of the jumps. Thereby, elucidations of correlations of the individual helical jump motions are also scientifically and practically important in further understanding dynamic nature of the crystalline chains and the structural evolutions of polymer crystals. Here, we utilize enter-bands only detection of exchange (CODEX) and 2D exchange NMR to characterize molecular dynamics of the crystalline chains in PLLA $\alpha$ phase. Dynamic geometry, correlation time, and short-range correlation of individual chain dynamics of PLLA in the crystalline region are for the first time reported.

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