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Molecular Dynamics of Poly(L-Lactic Acid) at around Glass Transition Temperature Elucidated by Solid-state NMR[1] WEI CHEN, TOSHIKAZU MIYOSHI, the University of Akron — Chain dynamics in so-called α_c mobile crystals obey Arrhenius type behaviors at temperatures well above the glass transition temperature (T_g) and below the melting temperatures (T_m), while segmental motions of amorphous components above T_g follows WLF behaviors. If polymer chains in the crystalline regions perform overall chain dynamics at temperature around T_g, how does dynamic correlation time $<\tau_c>$change as a function of temperature? PLLA possessing a relatively high $T_g \approx 60$ °C will provide an opportunity to challenge such a general question in polymer dynamics. Here molecular dynamics of PLLA chain in homo- ($\alpha\alpha$', and glassy states) and stereocomplex (SC) systems are investigated by Solid–State NMR. Results verify that the chains within crystalline region in α and SC begin molecular dynamics at temperatures well above T_g and temperature dependence of $<\tau_c>$in both systems follows Arrhenius behavior. In the disordered α' phase, the molecular dynamics of the backbone continues even at temperatures below $\sim T_g+ 10$ °C. The temperature dependence of $<\tau_c>$shows a non-Arrhenius behavior. The unique temperature dependence of molecular dynamics of PLLA in glassy state, disordered crystals, and stable crystals will be elucidated.

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