(3) Macromolecular:

203 - NMR studies for the development of tissue-engineering biomaterials based on silk fibroin and polyurethane

View Session Detail

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Abstract Body: Silk fibroin (SF) has some good properties for biomaterials like high strength, high elasticity, biodegradability and biocompatibility. However, in order to use as regenerative medical materials, the physical and biological conditions should fit as much as possible to the target tissues. Therefore, we are trying to create new SF-based materials having various physical properties by compounding some kinds of polyurethane (PU). In this study, the miscibility and the molecular dynamics of SF-PU compounds were researched by solid-state NMR methods. These properties are important to consider the availability of the composites, because they are intimately connected with the physical properties of the resulting biomaterials. It was indicated that each domain size in the SF/segmented PU (sPU) composites depended on the mixing ratio by the T_1H measurements. It means that SF and sPU would be miscible in several tens of nanometer scale. From the $T_{1\rho}$ measurements, the molecular motion of the soft segments in sPU of the SF/sPU composites was slower than that of the solitary sPU, suggesting that the soft segments in sPU interacted with SF. These results provided basic but useful structural information about the composites for the development of the SF-based tissue engineering materials using PU. Results of precise analyses of the NMR spectra from various SF/PU composites will be reported in the presentation.
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