

Abstract Submitted
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Structure and mechanical properties of isotactic polypropylene (iPP) gels formed at different cooling temperatures RYUSUKE OKOSHI, ATSUSHI HOTTA, Department of Mechanical Engineering, Keio University — The effects of the cooling temperature on the crystalline network formation and the mechanical properties of isotactic polypropylene (iPP) gels were evaluated. iPP/decahydronaphthalene gels were prepared at different cooling temperatures varying from 25 degrees C to -196 degrees C. Tensile test was carried out to measure the mechanical properties of the gels. Scanning electron microscopy (SEM) and differential scanning calorimetry (DSC) analyses were conducted to observe the density and the homogeneity of the network structures. It was found that the iPP gel quenched at -196 degrees C was highly elastic, exhibiting the highest fracture strain and stress of 2500% and 230 kPa. The SEM analysis revealed that nanocrystals were formed, which acted as crosslinkers that were distributed throughout the gels by quenching below -40 degrees C. By contrast, spherulites were observed to have grown inhomogeneously by cooling above -20 degrees C. It was found by DSC that the amount of crystals was increased by decreasing the cooling temperatures, indicating an increase in the density of the network structures. From these results, it was therefore concluded that iPP gel quenched at -196 degrees C possessed the highest mechanical property due to its dense and homogeneous network structures.

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