

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Structural analysis and mechanical properties of syndiotactic polypropylene (sPP) gels formed at different cooling temperatures KEITA TAKAESU, ATSUSHI HOTTA, Department of Mechanical Engineering, Keio University — The effects of the cooling temperature on the mechanical properties and the microstructure of the syndiotactic polypropylene (sPP) gel were investigated. sPP/decahydronaphthalene gels were prepared at different cooling temperatures followed by the compression testing to evaluate the mechanical properties. To analyze the microstructure of the gels, optical microscopy observation, differential scanning calorimetry (DSC) analysis, Fourier transform infrared spectroscopy (FTIR) analysis, and small angle X-ray scattering (SAXS) analysis were carried out. It was found that the sPP gel prepared at the lowest cooling temperature using liquid nitrogen (named Gel LN) showed highest mechanical properties. The sPP gels cooled at relatively high temperatures of 38°C (Gel 38), 25°C (Gel 25), and 0°C (Gel 0) became more brittle. DSC analysis and FTIR analysis revealed that the crystal amount, which acted as the crosslinking points of sPP gels, of Gel LN was largest among other sPP gels. In addition, SAXS analysis suggested that the size of each crystalline domain in Gel LN was about 15 nm. It was concluded from these results, that Gel LN exhibited the highest mechanical properties due to its homogeneous and dense crystalline network structures.

Keita Takaesu
Department of Mechanical Engineering, Keio University

Date submitted: 09 Nov 2012

Electronic form version 1.4