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sPP gel with high mechanical properties and high transparency by supercooling in mixed solvents KEITA TAKAESU, ATSUSHI HOTTA, Department of Mechanical Engineering, Keio University — Polymer gels are generally classified into chemical gels and physical gels depending on the types of crosslinking points. Physical gels are known to possess significantly poorer mechanical properties than chemical gels due to relatively weak crosslinking bonds in physical gels such as hydrogen bond and an intermolecular bond. In this work, physical sPP gels with extremely high mechanical properties and high transparency were successfully created by supercooling in mixed solvents. From our previous work, it was found that supercooling of physical gels (sPP/decalin gels) could produce gels with high mechanical properties comparable to chemical gels but maintaining the advantages of physical gels such as stimulus-responsiveness and reversibility, which cannot be realized by using chemical gels. Here, we also used tetrahydronaphthalene (tetralin) as solvent. The mechanical properties of sPP/tetralin were degraded by supercooling but intriguingly enhancement in the mechanical properties of sPP gels could be observed by using mixed solvent of decalin and tetralin, which eventually showed twice as high fracture stress as sPP/decalin gels.

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