Synopsis of Original Research Paper

Synthesis and characterization of nano-porous silicone gel using supercritical carbon dioxide

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Three-dimensional crosslinked silicone gels were synthesized using Poly (dimethylsiloxane) (PDMS) macromonomers with the polymeric functional groups in both ends as crosslinked agents. The distance between crosslink points in the gel was increased with an increase of molecular weights of PDMS. We confirmed that the degree of swelling in toluene was increased with an increase in the distance between crosslink points of gels. Silicon gels were treated by supercritical carbon dioxide ($^{sc}CO_2$) at 40˚C, 11MPa for 2 hours. We observed that the degree of swelling of treated gels was little different from the untreated one, though unreacting monomers in gels were efficiently extracted by $^{sc}CO_2$. This is a first preliminary result on the treatment of the silicone gel by $^{sc}CO_2$, which shows the unique behavior unlike foaming technique. Additionally, a silicone gel was also obtained from a homogeneous solution consisting of s-PS and PDMS in dichloroethane (DCE) when it was cooled at the rate of 5˚C/min from 155˚C to room temperature. After drying gelated samples at 70˚C for 24 hours, a novel polymer blend type of the physical gel consisting of s-PS and PDMS was obtained. DMA measurements revealed that the novel type of a physical gel had a strong mechanical property and a high thermal stability. The crystallite of s-PS not only plays a role of the network junction in the physical gel but also prevents the macroscopic phase separation between s-PS and PDMS.