Hansen Solubility Parameters and Potential Applications of Poly(dicyclopentadiene) Gels

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Ring Opening Metathesis Polymerization (ROMP) yields polymeric materials with unique mechanical, optical, electrical and chemical properties. ROMP can be catalyzed by a broad range of metal-based catalytic systems, with forerunners being those of ruthenium, molybdenum and tungsten.[1] Bimetallic complexes with metal-metal bonds have been scarcely employed,[2,3] although they provide more precise control over the stereoselectivity, since both metal centers can be involved in the reaction. Among those, $Na[W_2(\mu\text{-}Cl)_3Cl_4(THF)_2]\cdot(THF)_3$ (**W_2**) turns out as an efficient yet inexpensive initiator for ROMP of a range of cycloolefins.[4,5] In this study, we implement **W_2** for the synthesis of poly(dicyclopentadiene) (**PDCPD**) gels via ROMP of dicyclopentadiene (**DCPD**). Those **PDCPD** dry-gels, which feature a high-*cis* configuration,[6] swelled in various organic solvents, mainly aromatic and chlorinated ones. A correlation can be made between the swelling behavior of the gels in each solvent and the Hansen Solubility Parameters (HSP) of the solvents, leading to an estimation of the HSP of mostly-*cis* **PDCPD**. Based on those findings, those **PDCPD** gels were used to separate organic solvents from water, exhibiting remarkably higher solvent uptakes than other synthetic organic polymers reported in literature.

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