Metallocene catalysts supported on nanosize polystyrene beads for elastomeric polypropylenes

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Metallocenes are of great interest for homogeneous olefin polymerizations due to the possibility of tailoring the properties of the polyolefins.¹ However, homogeneous metallocene catalysts have disadvantages such as the lack of morphology control and reactor fouling.² Since the middle of the 1990s, there have been a number of reports concerning the use of polystyrene based polymers as carriers for metallocene catalysts applied in olefin polymerization.³ More recently, nanosized polystyrene beads containing anchor groups as a support for metallocene and methylalumoxane complexes were also reported by our group.⁴, ⁵ Due to the small, uniform, and well-defined carrier particles, the supported catalyst fragmented completely and homogeneously within the final product during polymerization reactions.⁶, ⁷

The metallocene catalyst utilized in this study was bis[5-1-(5-methyl-2-furyl)indenyl]ZrCl₂ which produced elastomeric polypropylene.⁸ Due to the rubbery nature of elastomeric polypropylene, the handling of the product is not simple. Even though the morphology of the elastomeric polypropylene is necessary, there has been no investigation into the morphology control of the product. We present here the morphology of the elastomeric polypropylene product and the influence of the tacticity of the polymer in this heterogeneous propylene polymerization.
Preparation of catalyst supported on the nanosized PS beads functionalized with polypropyleneoxide.