

Polymer Chemistry

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Sequence precisely controlled co-polymerization by using rare-earth metal catalysts

The sequence precisely controlled polymerization of dienes and styrene by using rare-earth metal catalysts will be reported. The polymerization of styrene with extremely high syndioselectivity and catalytic activity have been achieved by using with almost the whole period of rare-earth metals-based catalysts. The DFT simulation reveals that the ligand contributes to lower the LUMO energy of the active species, thus the activation energy is reduced and the catalytic activity increases. Based on this, by changing the central metal size, the random, block, gradient and taper microstructured butadiene-styrene copolymers were obtained. The electron donating side arm of the ligand, on the other hand, may increase the electron density of the active species, therefore, increase its durability to the polar monomers such as, methoxyl and methysilyl styrene's, leading to, for the first time, highly active and syndioselectivity polymerization of these polar styrene's to give functional polystyrenes. In addition, the copolymerization of ethylene and styrene with polar styrene are achieved. The position of the substituted polar group influences the coordination mode of the polar styrene to the active metal center and further the reaction ratios of the polar and nonpolar styrene's, to afford different alternating ethylene/polar-styrene copolymers and styrene-polar styrene copolymers with different monomer sequence distributions.

Biography

Dongmei Cui has completed her PhD from Changchun Institute of Applied Chemistry, Chinese Academy of Sciences and Post-doctoral studies from Riken, Japan. She is the Full Professor and Holder of a "Hundred Talent Scientists Program" of Chinese Academy of Sciences, and a Group Leader of Rare-Earth Organometallic Chemistry and Catalysis. She has published more than 180 papers in reputed journals and claimed more than 40 patents.

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