BRANCHED POLYOLEFINS AS POLYMER SPECIALITIES

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Polyolefins are well established basic materials with excellent price-performance ratio. However, there could be problems with non-polar character of polyolefins in terms of dyability and compatibility with other materials. Incorporation of polar functional groups is the possibility to solve these issues. Functionalized polyolefins could be utilized as macroinitiators or substrates for copolymer synthesis. This can move polyolefins from commodity plastics to the field of polymer specialities.

In this work, we present several methods for polyolefin functionalization using coordination copolymerization to avoid tolerant but highly energy demanding free radical polymerization process used in industry. Nickel and palladium α-diimine complexes provide living coordination polymerization of α-olefins at mild conditions and due to chain-walking isomerization further allow control over the branching of final polymer leading to special polyolefins with supressed crystallization.[1] End-chain functionalization is enabled owing to living character of polymerization (a) by transfer of chain from living growth centre to an organometallic transfer agent followed by cleavage of carbon-metal bond or (b) by addition of polar vinyl comonomer into polymerization system after polymerization of olefin.[2] In-chain functionalization is enabled by olefin copolymerization with polar comonomers owing to lower oxophillicity of late transition metal α-diimine complexes.[3] End-chain functionalized polyolefins can be used for block copolymer synthesis whereas in-chain functionalized polyolefins can be used for graft copolymer synthesis.[4]

References

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