

Transition Metal Cationic Catalysts for Olefin Oligomerization and Polymerization Processes.

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Concepts and mechanisms of the transition metal cationic catalysts for oligomerization and polymerization processes will be discussed. Latest theoretical and experimental developments in this field of chemistry will be reviewed from the $S_E C_i$ metallinium-ionic mechanism point of view. Extensive studies of the hydrovinylation, ethylene and butadiene polymerization indicate the metallinium-ionic intermediates as active species for oligomerization and polymerization reactions. The roles of both the agostic metal-hydrogen bonds and steric effects will be analyzed.

We will analyze the roles of transition metal centers in chain initiation and propagation steps of the reactions. Metallothropic isomerization reaction occurring in the metal-alkyl chains also will be discussed.

Lately, we have developed series of highly active and selective homogeneous catalysts (with turnover numbers up to $10^5 - 10^6 \text{ sec}^{-1}$) for the low olefins (co)dimerization, oligomerization and polymerization reactions. Among them are the selective homogeneous Ni-, Co-containing hydrovinylation catalysts, Ti- and Zr-containing catalysts for production of polyethylene with controlled MMD, bifunctional Ni- and Co-containing catalyst-stabilizers for production of polybutadiene with controlled stereo-regularity. In my talk, I will discuss these new and exciting catalytic processes in more details.