Nowadays, the development of **controlled radical polymerization** (CRP) appears as a major achievement because it paved the way to the synthesis of unprecedented and precise macromolecular architectures. An emerging class of CRP today is **Organometallic-Mediated Radical Polymerization** (OMRP). The latter is based on the reversible deactivation of the growing radical chains by a transition metal species (See scheme below). All along the polymerization, the dominating population of inactive chains is in equilibrium with a low amount of active ones, which strongly decreases the probability of irreversible termination reactions, abundant in a free radical polymerization. Some Titanium, Cobalt, Chromium and Vanadium complexes have been successfully used as regulating agents and the so-called **Cobalt-Mediated Radical Polymerization** (CMRP) is the most versatile system, until now. Mechanistic and synthetic progress of CMRP as well as remaining challenges will be presented in this communication.

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P - [M_t^{n+1}] \xrightarrow{k_p} \xleftarrow{k_c} \xrightarrow{k_d} P^* + [M_t^n]
\]