

# Functionalized Main-Group Organometallics (Li, Na, Mg, Zn) in Organic Synthesis

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In this course, we will describe the major preparation methods of main-group organometallics (Li, Na, Mg, Zn) emphasizing especially the synthesis of highly functionalized organometallic reagents and their applications in organic synthesis.

We will start in a first lecture with the oxidative addition of metals to organic halides and show the importance of LiCl for facilitating these reactions. Halogen-metal exchanges will be developed in a second lecture showing their utility for the stereoselective synthesis of chiral organometallic reagents. After discussing the importance of transmetalation reactions in a third lecture, our attention will be focused on C-H activation reactions of various aromatic and heterocyclic substrates using various metal amides (TMP-bases) for two more lectures. General guidelines and rules will be given to facilitate the rational metalation of complex aromatics and heterocycles. The importance of performing reactions in continuous flow will be then discussed. After a presentation of the most important hydro- and carbo-metalation reactions of alkenes and alkynes, the last part of the course will present various transition metal catalyzed cross-couplings involving Zn and Mg-organometallics. Numerous applications in natural product and pharmaceutical synthesis as well as in material science will be included.