

Ruthenium Catalysts toward green and sustainable chemistry: Activation of alkynes, alkenes and C-H bonds in water

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Ruthenium(II) catalysts due to their unique activation processes allow selective useful transformations of simple substrates tolerating functional groups. Due to their easiness of preparation, stability even to water they tremendously participate to innovations to green chemistry and sustainable development.

Three examples will be presented.

Cp*Ru(II) based catalysts will be shown, via ruthenium-vinylidene and alkylidene species, to contribute to the selective transformation of alkynes into functional alkenes, dienes and bicyclic products.(1-3)

Alkene metathesis ruthenium catalysts constitute a power for giving value to intermediates arising from biomass from selective transformations of terpenes and for the access to polyamide precursors from plant oil derivatives and via catalyses in cascade.(4,5)

Ruthenium(II) catalysts have been revealed as non expensive precursors for **the activation of C-H bonds** and their functionalization via C-C bond cross couplings. It will be shown that ruthenium(II) catalysts, associated with carboxylate or phosphate partners, easily lead to the deprotonation of the sp^2 C-H bond, and that water as solvent increases the activity of ruthenium catalysts. Examples of C-C bond cross-couplings involving functional arene C-H bonds will be presented, via direct controlled mono or diarylations, for the synthesis of polydentate nitrogen containing ligands, and via dehydrogenative alkenylations. (6-9)

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