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Cobalt(II) catalysts applied to the hydrosilylation of esters for the sustainable synthesis of aldehydes and alcohols

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PURPOSE OF THE ABSTRACT
Esters are ubiquitous in natural products, building blocks or targets for fine chemicals, farming-related chemicals and biologically active compounds.[1] The hydrogenation of these compounds is of prime importance for the fine and bulk chemical industry.[1] However, the hydrosilylation reaction which can be operated in mild conditions, at atmospheric pressure, is an interesting alternative to hydrogenation of esters and silanes have also a modular reactivity.[2]
Whether we have recently shown Iridium(III) metallacycles[3a] can effectively catalyse the hydrosilylation of carbonyl and carboxylic acid derivatives[3b-e], the use of abundant and low cost transition metal catalysts is more and more required due to societal, economical and environmental reasons.[4]
Herein, we will highlight Cobalt(II) salts combined with NaBHEt3 and eventually a base catalyse efficiently and selectively the reduction of esters to aldehydes or alcohols through hydrosilylation by using phenylsilane. Catalyst characterisations by XRD, XPS, TEM and STEM analyses indicate the materials were partially crystalline with the presence of cobalt nanoparticles. Control experiments suggested low valent Cobalt(0) was the active catalytic species involved. Interestingly, one catalyst was successfully reused up to 4 cycles without significant loss of selectivity. [5]

FIGURES

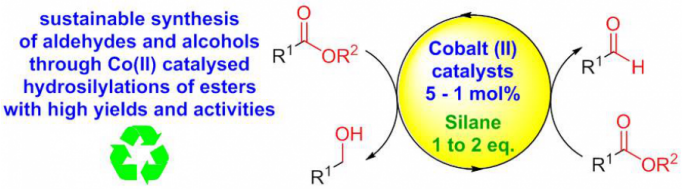

FIGURE 1

Figure 1

Cobalt(II) catalysts applied to the hydrosilylation of esters to aldehydes and alcohols

FIGURE 2

KEYWORDS

cobalt | nanoparticles | hydrosilylation | aldehydes

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