Supported Nickel nanoparticles on halloysite-based supports: synthesis, characterization and applications in catalytic hydrogenations

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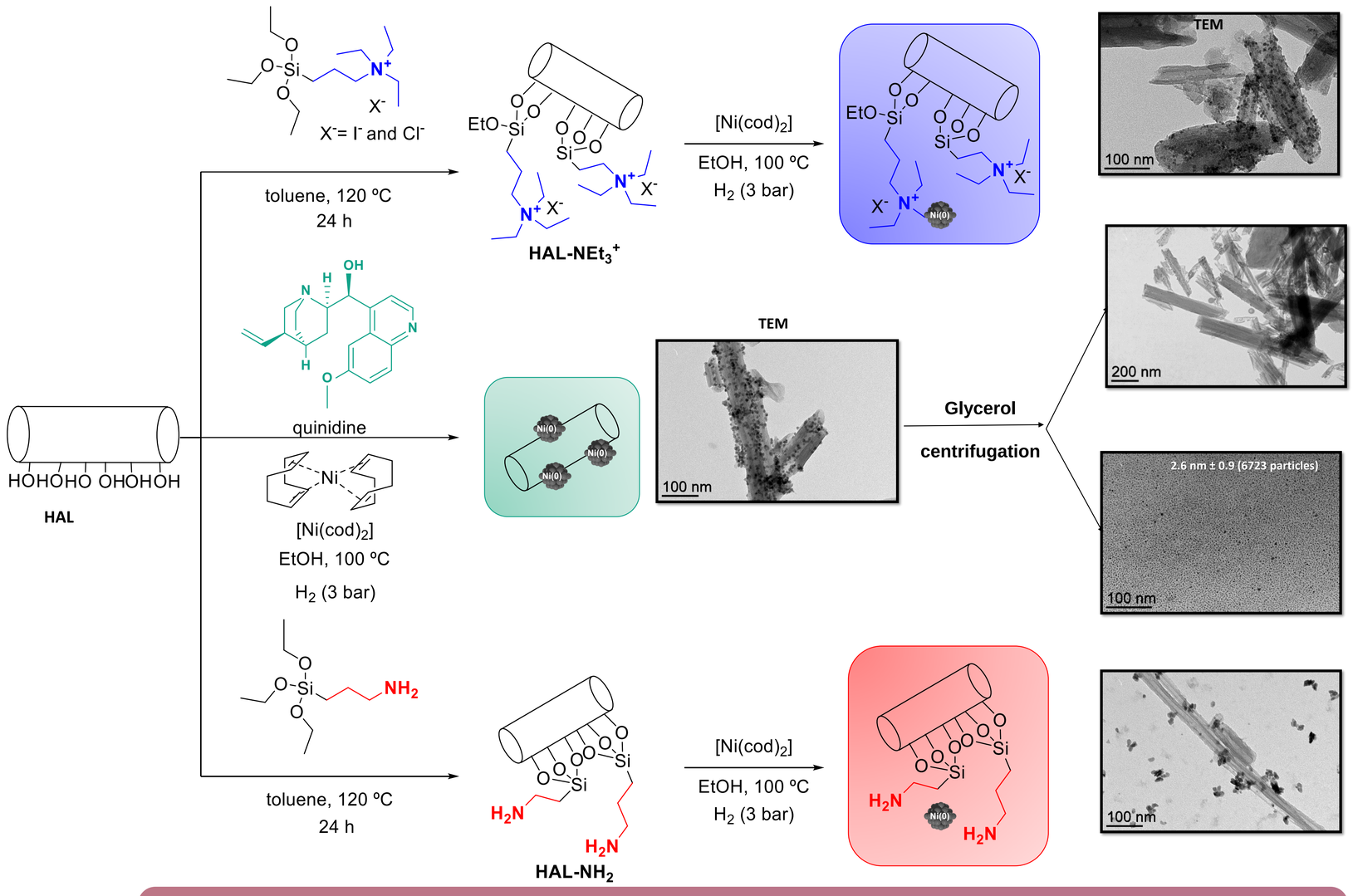
INTRODUCTION

Natural clays are a versatile and abundant materials. Among them, **halloysites** (which have a nanotubular shape) exhibit a big surface area (between 50 and 137 m^2/g), an important porosity and acidity (silanol groups at the surface). Here **novel halloysite supported Ni-based catalysts** are presented (NiNP@HAL), showing an **attractive surface reactivity in hydrogenation reactions of a wide variety of substrates**

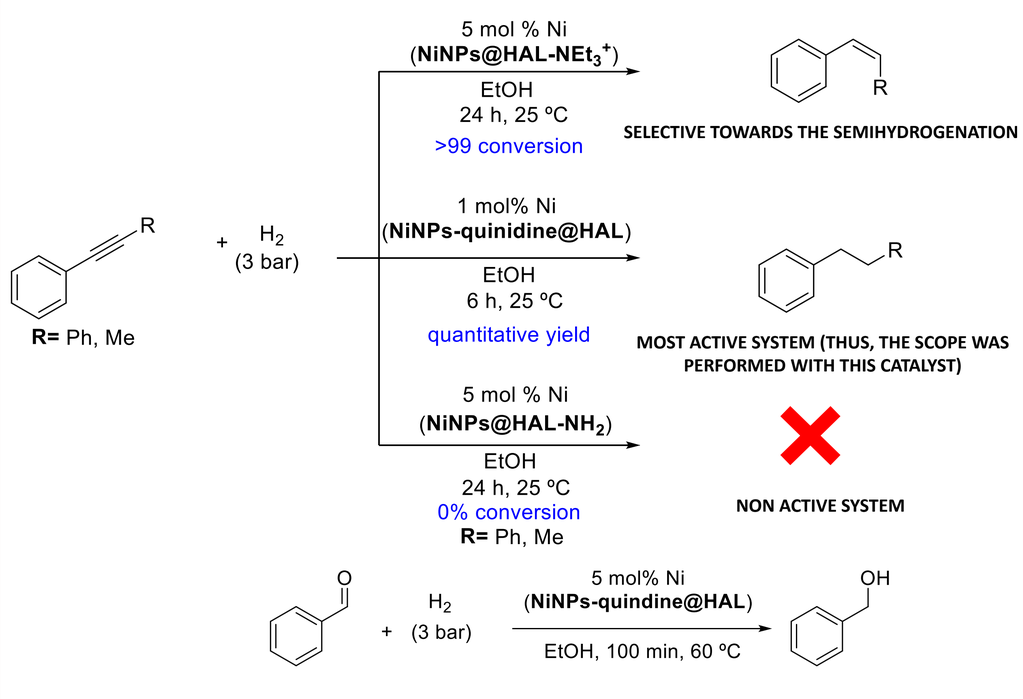
RESULTS

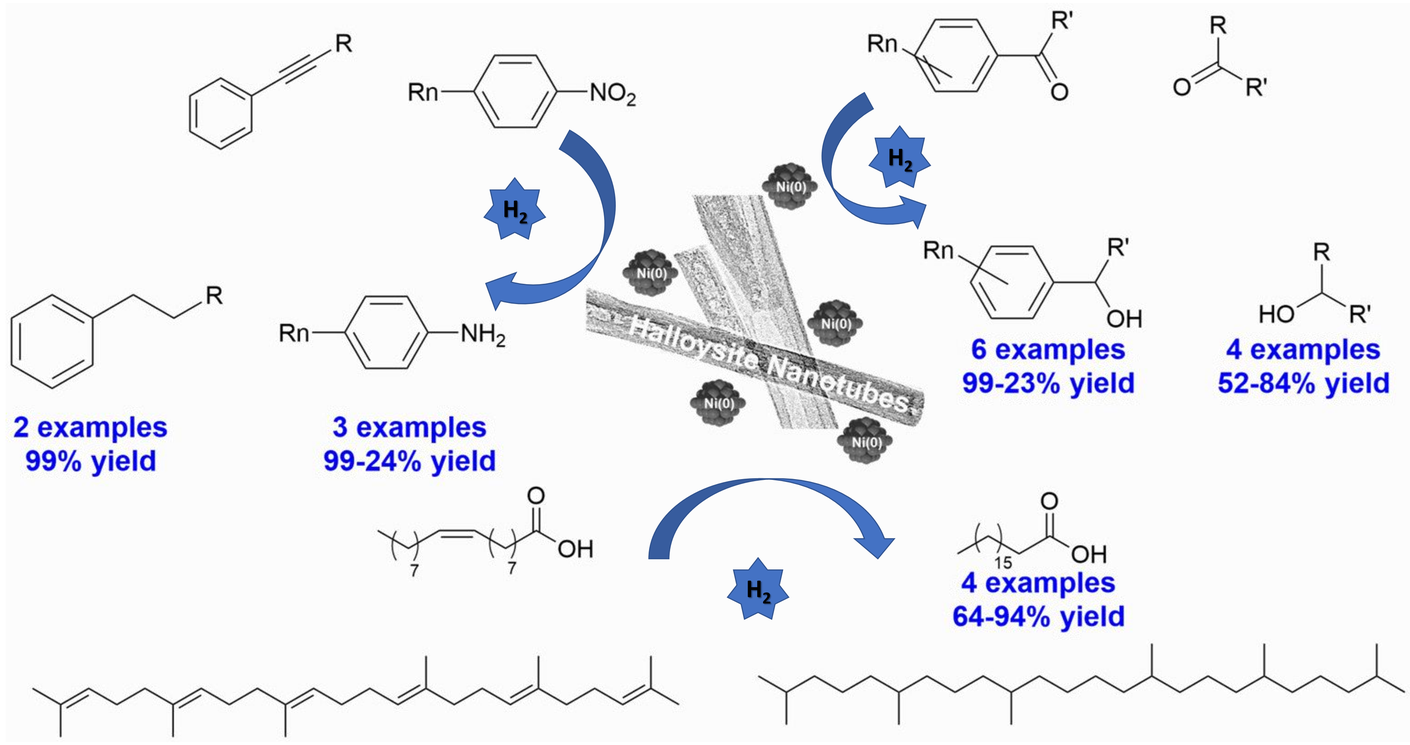
SYNTHESIS AND CHARACTERIZATION of NiNP@support

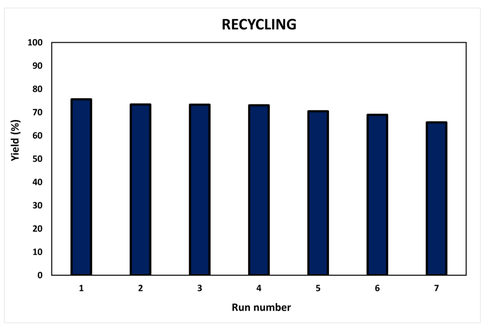


- **Successful functionalization of the support**
- **Formation of small and spherical nickel nanoparticles (*ca.* 3 nm) .**
- **Successful preparation of nickel-supported halloysite catalysts.**

Ni-CATALYZED HYDROGENATIONS







- **NiNPs-quinidine@HAL showed to be the most active system towards hydrogenation**
- **A wide variety of functional groups was successfully hydrogenated under smooth conditions**
- **The catalyst was recycled up to 7 consecutive runs**

CONCLUSIONS

We prepared **nickel nanoparticles** supported on both natural nanoclay and functionalized halloysites featuring amino and ammonium groups. **Each** catalytic material **presents different reactivty profiles**. In particular **NiNP-quinidine@HAL** exhibited a remarkable versatility, permitting its recycling.

References: Zhang Y. et al. *Sci. Rep.,* **2013,** *3,* 2948; Massaro M. et al. *J. Matter. Chem. A.,* **2017,** *5,* 13276; Reina A.et al. *Adv. Synth. Catal.,* **2018,** *360, 3544*; Duarte T. A. G. Et al. *ChemCatChem.,* **2020,** *12,* 2295

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