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## Catalysts for H<sub>2</sub>-cleanup technologies. The role of the support

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Since E. Davy at the beginning of the 19th century is customarily accepted that metal dispersion plays a fundamental role in the activity of solid catalysts and therefore enormous efforts were dedicated to reduce the size of the active phases since the increase of the surface-to-volume ratio on reducing particle sizes. The development of nanotechnology has resulted in synthetic strategies for nanomaterials allowing metal nanoparticles with well-defined surfaces. This has led to fill the gap between the reactivity of well-defined faces of metal single crystals and conventionally prepared catalysts with a broad size distribution of the metal particles with uncontrolled shape. As a result of these advances the modification of the catalyst selectivity by altering size and/or shape of the nanoparticles has been clearly understood as well as the molecular factors that cause them, including structures,

surface compositions, oxidation states and gaseous environments. For instance, the size modification affects the relative proportion of exposed faces of FCC metal nanoparticles. This has a significant effect on the metal activity in, for instance, oxidation reactions. However, on supporting these metal nanoparticles a direct relationship between the size/shape and the catalytic activity may not be present

In this talk, we address the role of the support in a set of relevant catalytic reactions for H<sub>2</sub>-cleanup: WGS, COPROX and the Sabatier reaction. Operando studies of these reactions help in understanding the synergies occurring at the metal interfaces during the catalytic reaction that sometimes are of greater relevance than size or shape.

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