Nanohybrid catalysts applied to synthetic transformations.

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Supported metal nanoparticles are attracting increasing interest because they allow for clean, selective and efficient catalytic transformations. In addition, supporting of the metals offers the possibility to recover the active catalyst, allowing it to be reused. Numerous metals, including gold, have been assembled onto solid supports although metallic gold has traditionally been regarded as a poor catalytic species. The catalytic activity of gold is however dramatically enhanced when downsized to nanoscale. This peculiar behavior of nano-gold has recently boosted its use in fine chemical synthesis applied, for example to selective hydrogenations, carbon-carbon bond formation, or oxidations.

Various materials can be used as support for nanoparticles including clays, zeolites, polymers, metal oxides, amorphous carbon, etc. Compared to other supports, carbon nanotubes (CNT) provide some advantages that include chemical, thermal and mechanical stability, inertness, high specific surface area, and chemically tunable topography. Moreover, CNTs are electronically active and are likely to contribute to the stabilization of the metals. We recently reported carbon nanotube-based hybrid catalysts that were assembled using a layer-by-layer strategy. These nanohybrids, incorporating various metals, and exhibiting specific catalytic properties, were applied to a wide variety of organic transformations. Some chemistry based on CNT-metal hybrids will be presented, including flow chemistry approaches.

Selected references:

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- Catalytic hydrothiolation of alkenes and alkynes using bimetallic RuRh nanoparticles on carbon nanotubes. D.V. Jawale, J.A. Tchuiteng Kouatchou, F. Fossard, F. Miserque, V. Geertsen, E. Gravel, E. Doris. *Green Chem.* **2022**, *24*, 1231.