CLEANUP: NEW HETEROGENEOUS CATALYSTS BASED ON A NEW FUNCTIONALLIZATION PROCESS OF POROUS MATERIAL WITH SUPERCRITICAL CO_2

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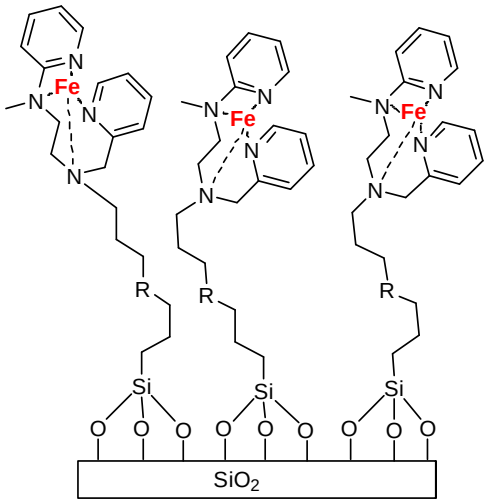
Abstract

Supercritical carbon dioxide ($scCO_2$) is an attractive solvent alternative for a variety of chemical and industrial processes, especially because it is plentiful and inexpensive. [1]
The advantages of using $scCO_2$ have been numerous, like an excellent solvent for alkoxysilanes. With a density close to the liquid, but a very low viscosity and a surface energy close to zero, the $scCO_2$ easily diffuses into porous materials. [2] In addition, the diffusion coefficients and high self-diffusion allow very rapid transfer of reagents. [3] The other advantage is that treatment with $scCO_2$ is a process called soft and considered as a method of green chemistry. [4] $ScCO_2$ is also non- toxic, non-flammable, easily recyclable and chemically neutral. Finally, after the rinsing step, the $scCO_2$ will simply evaporate thus avoiding the inconvenience of drying, including treatment degradation or nanostructures.[5] The supercritical phase deposition (SFD) is mainly used for the preparation of chromatographic stationary phases [6] including the functionalization of porous silica beads with different fluoroalkyl- or mercapto-silanes. [7]

In this project we have synthetized two new catalytic systems, **1** and **2**. Both catalytic systems have been prepared from a new grafting method in supercritical CO_2 path of bio-inspired iron based catalysts [8] on porous substrates, such as silica beads and carbon nanotubes, in order to activate oxygen as the oxidant.
We fully studied the optimum SFD for grafting a monolayer of new synthesized ligands into silica beads and carbon nanotubes and the coordination with iron species.
These catalysts have been tested in the oxygen degradation of naphtlene and promotion of methane, giving excellent results. Work is in progress to give more applications.



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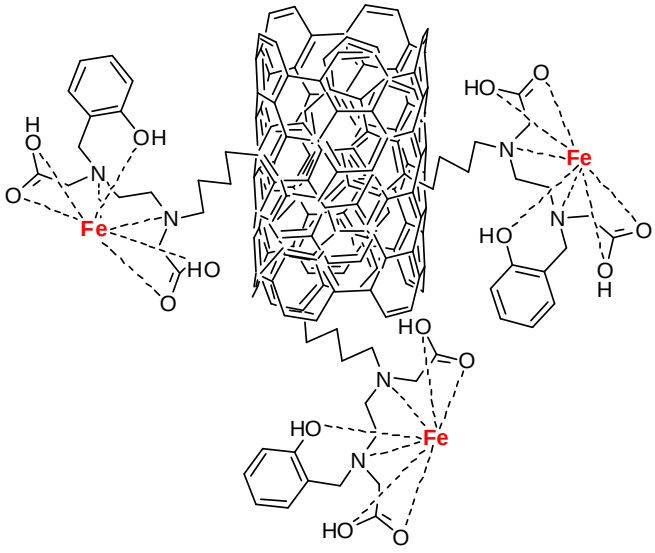

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References

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