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Nanocarbons: Highly Active Catalysts for Chemical Reactions

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Metal or metal oxides are conventional catalytic materials that are well-developed for many industrial reactions. Recently, there are many efforts to develop metal-free catalysts to replace the traditional catalyst due to the limited natural resource, for the environmental protection and for energy saving. Carbon materials are usually used in catalysis as supporting materials. However, carbon as the catalytic substance can have significant advantages over the conventional metal-supported systems owing to the unique controllability of both its surface acidity/basicity and π - electron density through surface functionalization. In a carbon material it is the short- and long-range ordering of atomic carbon that essentially determines the macroscopic properties (e.g. thermal and electronic conductivities, combustibility) and thus its long-term performance in any potential industrial process

We have used nanostructured carbons, especially carbon nanotubes, as catalyst for the production of styrene from oxidative dehydrogenation of ethyl benzene and for the activation of n-butane into C₄ olefines. We found that nanocarbons are highly active catalyst for dehydrogenation reactions. The performance of nanocarbons in the mentioned two reactions, the comparison with industrial catalysts and the possible reaction mechanism will be presented. The future perspective of nanocarbon as catalyst and the corresponding challenge to the carbon community will be discussed.

Reference

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