Macroscopic shaping of carbon nanotubes for large scale application

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Nanocarbons such as CNTs and CNFs with well-defined surface-chemical and mechanical properties show promising performance in many applications, for instance in catalysis as catalyst or catalyst-support, or in environmental technology as absorbent. Loose CNTs/CNFs are unsuitable for large scale application since their suprastructural properties cannot be controlled [1]. From the point of view of chemical engineering, the use of nanoscopic catalysts is hampered in large-scale fixed-bed reactors because of the large pressure drop across the catalyst bed and the problems linked with handling and transport of these materials. Nanocarbons formed into larger objects is needed to optimize the reaction process and to allow effective contact with reacting matrices. Carbon fibers [2] and SiC foam [3] with a fully accessible macroscopic structure have been used as support for composite-catalyst. We have immobilized CNTs on SiC and SiO_2, two widely used support for industrial catalyst. CNTs with a loading of 0.5 to 4 wt % could be grown on SiC foam with various forms, as it is shown in Figure 1. These CNTs/SiC and CNTs/SiO_2 composite catalysts have been tested for the oxidative dehydrogenation of butane to butadiene showing promising results [4].

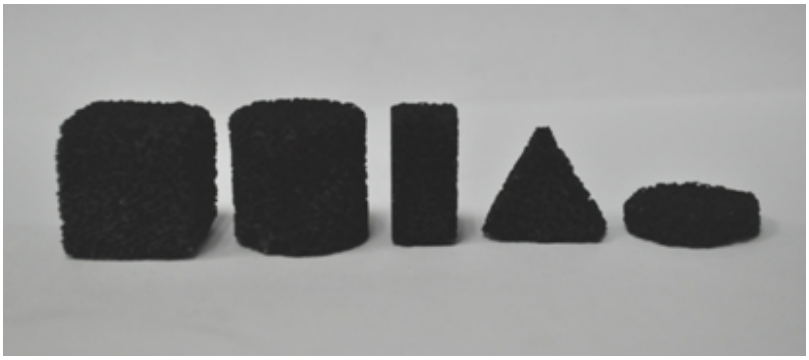

Figure 1 Photograph of CNTs/SiC foam catalyst in various macroscopic forms.

References

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