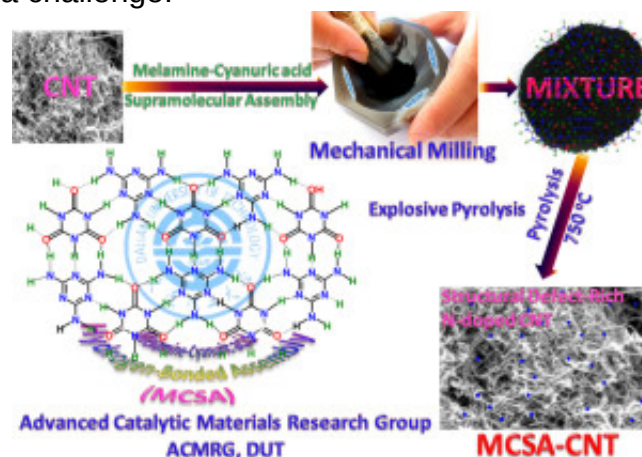


Efficient tuning of carbon surface: Defect-enriched CNT

To face energy and environmental issues, the importance towards development of novel catalytic materials with clean and highly efficient feature is self-evident, since the catalysis is the cornerstone for chemical industries. The development of low-cost sustainable catalysts with high catalytic activity, selectivity, and stability under mild conditions remains at the heart of modern material chemistry, green chemistry, and catalysis fields for academic and practical aspects. Although the metal catalysts have currently been playing major roles in various industrial transformation processes, they still suffer from many inherent disadvantages such as low-availability, high cost, susceptibility to gas poisoning, detrimental effects on our environment, besides the residual metal in products. Owing to the broad availability, environmental acceptability, corrosion resistance, and unique surface properties, nanocarbon materials have been demonstrated to be promising and sustainable low-cost metal-free alternative to metal-based catalysts for organic synthesis, hydrogen production, photodegradation of organic pollutants, the crucial oxygen reduction reaction in fuel cells, and as counter electrode catalyst for solar cells. Nowadays, the carbocatalysis has already attracted great attention throughout the world, and become the foreland and hot topic in the heterogeneous catalysis and sustainable chemistry. However, the low-cost and facile large-scale production of the nanostructured carbon materials for industrial application is highly desirable but remains a challenge.



Surface and interface of solid catalysts are the places where the reactions take place. Tuning surface and interface of catalysts can be a sapiential strategy for fabricating highly efficient solid catalysts. The surface ketonic group and structural defects have been established to be active for direct dehydrogenation of ethylbenzene. Therefore, the development of an efficient method to enrich surface ketonic group and structural defects is highly desirable. In this work performed in Prof. Zhongkui Zhao's Advanced Catalytic Materials research group, Dalian University of Technology, a facile but efficient strategy for fabricating defect-rich N-doped carbon nanotube (MDSA-CNT) through the controllable explosive pyrolysis of a melamine-cyanuric acid supramolecular assembly has been presented. This work had been published in Chem. Eur. J.

selected as a Hot and frontispiece paper. In comparison to pristine carbon nanotubes, MCSA-CNT exhibits significantly enhanced catalytic performance in oxidant- and steam-free direct dehydrogenation of ethylbenzene, demonstrating the potential for metal-free clean and energy-saving styrene production. This finding also opens a new horizon for preparing highly-efficient carbocatalysts rich in structural defect sites for diverse transformations.

Publication

[Explosive decomposition of a melamine-cyanuric acid supramolecular assembly for fabricating defect-rich nitrogen-doped carbon nanotubes with significantly promoted catalysis.](#)

Zhao Z, Dai Y, Ge G, Wang G.

Chemistry. 2015 May 26