# Roles of Mesopores of Y-type Zeolite Catalysts

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Y-type zeolite-based catalysts have many advantages for the hydrocracking of the petroleum fractions. In the case of the hydrocracking of heavy oils, however, the diffusional limitation of large size molecules into the micropores of Y-type zeolite occurs. Therefore, active catalytic sites are limited to the external surface, that is, the external surface of zeolite particles and the mesopore surface. In this study, the roles of mesopores of Y-type zeolite catalysts for the hydrocracking of heavy oils were investigated.
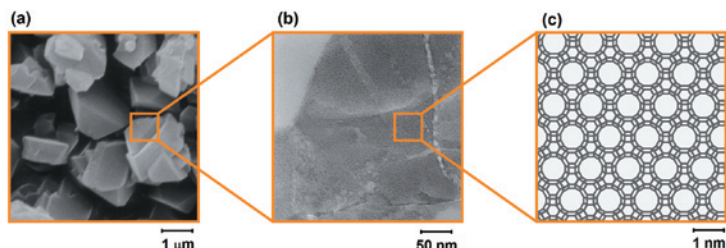

Bimodal structure of Y-type zeolite. (a) zeolite particles observed by scanning electron microscopy (SEM), (b) mesopore structure observed by transmission electron microscopy (TEM), (c) micropore structure.

The Highest Efficiency of NO_x Decomposition by Nano-Structurally Controlled Electrochemical Cell

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Electrochemical cells have become an important technology which contributes to environmental aspects of human life and industry. The Environment Purifying Materials Team of Synergy Materials Research Center has successfully fabricated high performance electrochemical cells for reduction of NO_x gases emitted from diesel engines and so on. Nano-structural control in the catalytic electrode of the cells has been proposed and optimised. A nano-reaction space composed of catalytic reduction phase of Ni nano particles with oxygen defects in YSZ surrounding nano-pores enhanced NO_x decomposition reaction drastically. Efficiency of NO_x decomposition to consuming energy of the newly developed electrochemical cell reached twice of it for the catalytic system, which is practically used in vehicles.
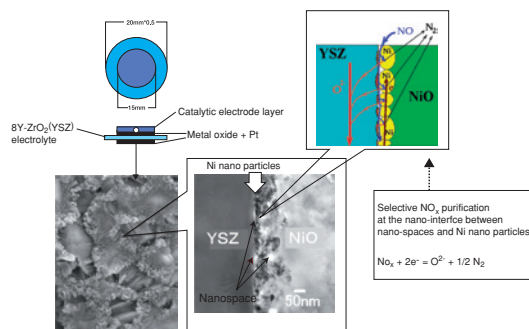
Scheme of nano-structurally controlled electrochemical cell for selective NO_x decomposition