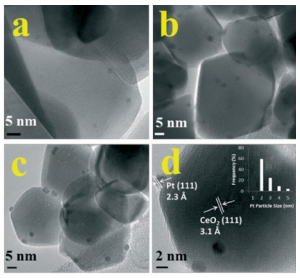
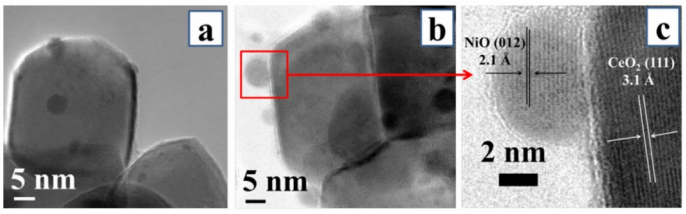
Methane activation over nanostructured catalyst:

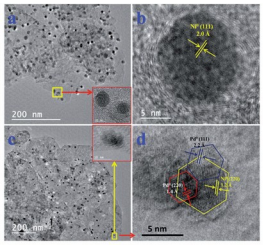
Methane is the major component of natural gas, shale gas and clathrate hydrate. The successful utilization of methane is a real challenge for researchers. We have successfully prepared nanocrystalline Pt–CeO2 catalyst with high activity and selectivity in the low temperature partial oxidation of methane.



Ni-nanoparticles supported on CeO2nanopar-ticles were synthesized by two step preparation method. First, 30–50 nm CeO2was synthesized bysolvo-thermal method and then Ni- nanoparticles were deposited over it following a newly developedprocedure, where cetyltrimethylammonium bromide (CTAB) acted as morphology controlling agent andpolyvinylpyrrolidone (PVP) as size controlling agent for nickel nanoparticles. The catalysts showed excellent coke resisting ability during POM and produces synthesisgas with H2/CO ratio almost 2.



A Pd-doped Ni–MgO catalyst was prepared for synthesis gas production by dry reforming of methane (DRM). The catalyst was prepared by a two-step method; first a high surface area MgO support was prepared by a hydrothermal method then Pd and Ni nanoparticles were deposited by sublimation of the precursor salts. The increased activity of the Pd/Ni–MgO catalyst was due to the easily reducible Ni-oxide particles and much smaller Pd-particles, which were active for the DRM reaction at lower temperature. The best feature of the synthesized catalysts was the ability to inhibit the reverse water gas shift (RWGS) reaction, which highly improved the H2/CO ratio.



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