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Nano-structured catalysts for energetic and environmental applications

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Abstract

A good heterogeneous catalyst should have a structural organization that maximizes the amount of active centers on the surface. The modern heterogeneous catalysis is addressed to more and more performing materials and all recent studies converge on the use of highly dispersed phases to create interaction among catalyst components in the nanometric range to provide new special properties. In particular, the catalyst design is based on dispersion of active metals on supports and/or addition of dopants or promoters affecting the metals performance through the creation of novel nano-structures.

The role of dispersion of active metals at nanometric level is analyzed through three different catalytic reactions that fall in the field of energetic and environmental applications. The interaction of active rhodium nano-particles deposited on alumina with phosphorous or lanthanum, determining the activity in dry reforming of methane and the resistance to poisoning is described as first example. The very high dispersion of copper on nanometric CeO2 support providing an outstanding activity of this catalyst coupled to a very good selectivity in the oxidation of CO in H2 rich stream for fuel cells is reported as second case study and, finally, the strongly improved contact between CeO2 nano-particles, dispersed into the pores of a diesel particulate filter and soot produced by diesel engine is reported as special case of a solid-solid catalytic reaction.

Biography

Luciana Lisi is a senior researcher at the institute ricerche sulla combustione of the C.N.R.-Italy, She holds a PhD in chemical engineering from the university of napoli federico II. She works in the field of heterogeneous catalysis and catalytic processes for energy production and environmental protection. Her areas of research include: catalytic combustion, catalytic partial oxidation of light hydrocarbons, H2 production (Steam/ Dry/ Tri/ Photo-Reforming) & purification, H2 purification for fuel-cells, olefins production by oxidative dehydrogenation at short contact time, tar reforming, catalytic abetment of gaseous pollutants (DeNOx, diesel soot), methanation, preparation and characterization of heterogeneous catalytic systems, poisoning and regeneration of catalysts, structured and multifunctional catalytic reactors, in-situ spectroscopic characterization of catalysts. She has authored 120 publications in international (ISI) journals and more than 150 communications to scientific meetings.

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