

Supported Gold Nanocatalysts for CO Oxidation in Mainstream Cigarette Smoke

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Abstract : It has been suggested that nicotine, CO and tar in mainstream smoke are the most important substances and have been judged as the most harmful compounds, responsible for the health hazards of smoking. As nicotine is extremely important for smoking qualities of cigarettes and the tar yield in the tobacco smoke is significantly reduced due to the use of filters with various content and design, the main efforts of cigarettes researchers and manufacturers are related to the search of opportunities for CO content reduction. Highly active ceria supported gold catalyst was prepared by the deposition-precipitation method, and the possibilities for CO oxidation in the synthetic gaseous mixture were evaluated using continuous flow equipment with fixed bed glass reactor at atmospheric pressure. The efficiency of the catalyst in CO oxidation in the real cigarette smoke was examined by a single port, puff-by-puff smoking machine. Quality assessment of smoking using cigarette holder containing catalyst was carried out. It was established that the catalytic activity toward CO oxidation in cigarette smoke rapidly decreases from 70% for the first cigarette to nearly zero for the twentieth cigarette. The present study shows that there are two critical factors which do not permit the successful use of catalysts to reduce the CO content in the mainstream cigarette smoke: (i) significant influence of the processes of adsorption and oxidation on the main characteristics of tobacco products and (ii) rapid deactivation of the catalyst due to the covering of the catalyst's grains with condensate.

Keywords : cigarette smoke, CO oxidation, gold catalyst, mainstream

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