COMBINATION OF DIESEL FUEL SYSTEM ARCHITECTURES AND CERIA-BASED FUEL-BORNE CATALYSTS FOR IMPROVEMENT AND SIMPLIFICATION OF THE DIESEL PARTICULATE FILTER SYSTEM IN SERIAL APPLICATIONS

Michael D. Civiello

RHODIA Electronics & Catalysis Inc.

Paul Wouters

INERGY Automotive Systems Research

ABSTRACT

Diesel vehicles have an increasing market share in Europe. To further increase their environmental friendliness, control of particulate emissions is a key topic. Ceria-based fuel-borne catalysts have proven their efficiency to optimize the diesel particulate filter (DPF) efficiency and durability: since the market introduction of the DPF system in serial applications in May 2000 by PSA Peugeot Citröen, more than 500,000 vehicles have been DPF-equipped. Tracking the serial production current situation, several themes for improvement have been identified, including system simplification to limit its total cost as well as an optimized maintenance. The paper presents those upgrades that will be proposed in serial applications, in the near future.

Catalytic activity of ceria-based fuel-borne catalysts has been chemically tuned to meet the compromise between the catalytic activity (reduction in the temperature of soot burn-off and kinetics of DPF regeneration), the temperature peak generated during the DPF regeneration (exotherms of regeneration), and the density of the inorganic ash arising from the fuel-borne catalyst (ash build-up speed). A good compromise is proposed, based on the use of the iron-doped ceria nanoparticles as active catalytic ingredient.

In parallel, dosing strategies of ceria-based fuel-borne catalyst are being developed to match with the proposed evolution in the fuel-borne catalyst for serial applications. New designs of the automatic on-board dosing system are being developed to ensure the global accuracy in the diesel fuel treatment and to limit the maintenance operation for fuel-borne catalyst tank refilling.

Improvement and simplification of the DPF system for serial applications are based on the adaptation and the optimization of several functionalities of the global system. The next step of the "fit for life" target goes necessarily by co-developments between the various functionalities of global DPF system.