DESIGN OF CATALYTIC MATERIALS FOR PLASMA ASSISTED CATALYSIS SYSTEM

Paul W. Park and Jill E. Rockwood
Caterpillar Inc.

Christopher L. Aardahl, Craig F. Habeger and M. Lou Balmer
Pacific Northwest National Laboratory

In recent years, the Plasma Assisted Catalysis (PAC) approach for controlling NO_x and/or particulate emissions from mobile diesel engines has received a significant amount of attention from researchers. Substantial work has been performed by various researchers to develop an understanding of the reaction mechanisms in a plasma reactor in conjunction with conventional lean-NO_x catalyst materials. However, less effort has been devoted to systematically investigating new catalyst materials specifically designed for application in the PAC system. Since it is believed that plasma produces a unique environment for a catalyst bed (i.e. oxidation of NO to NO_2 and partial oxidation/reforming of hydrocarbon reductants in the exhaust), new catalytic materials that take advantage of the plasma reactor conditions need to be studied. Optimum catalyst materials will be required in order to develop a PAC system that achieves maximum deNO_x performance over the wide range of operating conditions in which the system will be required to operate for application on heavy-duty diesel engines.

This presentation discusses the issues involved in designing catalytic materials for achieving high NO_x conversion in a laboratory test PAC system, and what is required to improve the catalyst materials further for application in an on-engine environment.