

Emerging Trends in Vehicular Emission Control and Efficiency

Timothy V. Johnson
Corning Incorporated

This presentation will review the field of vehicle emission control with the intent of highlighting representative studies that illustrate the state-of-the-art. First, the author reviews regulatory requirements and general engine technology approaches for light-duty and heavy-duty applications. The presentation then reviews: diesel particulate filter (DPF) technology, covering regeneration strategies, filter properties, and durability and maintenance; NO_x control by SCR (selective catalytic reduction), and diesel oxidation catalysts (DOC). The author then summarizes the field of gasoline emission control, with focus on the emerging PN regulations in Europe and the LEV_{III} regulations in the US.

In general, there is increasing emphasis on fuel economy and CO₂ emissions. Biofuels and advanced engine technologies will play a key role. Progress is impressive and studies demonstrate that high-efficiency systems are within reach in all highway vehicle sectors. Engines are making impressive gains, and will increase the options for emission control. Filter technology is focusing on optimization, with work being done on better ways to regenerate the filter and improve system back pressure and durability. SCR NO_x control is focusing on low-temperature performance and system control, and is moving into optimization. DOCs balance HC and CO light-off with NO₂ generation, and new formulations are dropping light-off temperatures. Gasoline PN control can largely be accomplished with engine modifications, but gasoline particulate filters are very effective and have minimal adverse effects.