

Impact of Various Fuels with Different Molecular Structures on Combustion Process and Soot Formation

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Abstract - To address the people's increased concern on greenhouse gas emissions and global warming, we aim at exploring the most practical ways to improve the efficiency and reduce the major emissions from transportation vehicles. In this work, a series of experimental tests have been conducted to study the impact of various fuels with different molecular structures on sooting tendency in diffusion flames by optical diagnostic technology, followed by an extensive investigation on the combustion process and soot characteristics in a diesel engine fueled by various fuels. The results indicate that pentagon contain fuel, carbon chain length, the oxygen content and fuel properties have a major impact on combustion process and sooting tendency. The addition of PODE is able to reduce the overall soot emission, especially accumulated soot particles, however, more nucleate soot emissions in terms of number concentration are spotted from IC engines when 30% PODE is added under certain conditions.