## Abstract

**Project Code : TRG5780301**

**Project Title : Renewable Bio-oxygenated Fuel Particle Emission Trapping and Oxidation Behaviors inside Ceramic Micro-porous of Diesel Particulate Filters**

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The impact of small compression ignition (CI) engine operation conditions and fuel properties on diesel and biodiesel particulate matters (PMs) quantity using opacity smoke meter is investigated. The biodiesel engine's PMs are around a half of diesel engine PMs under the same engine operation conditions. Morphology of both engine's PMs are also studied using a Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and image processing method. The average primary nanoparticle sizes of diesel and biodiesel engine's PMs are approximately 34 nm and 32 nm, respectively. The result shows that engine operation condition and fuel property are strongly impact on the quantity and size distribution of primary nanoparticles emission. PM oxidation kinetics on conventional cordierite Diesel Particulate Filters (DPFs) powders by Thermo-gravimetric analysis (TGA) is also successfully studied. The calculated apparent activation energies of biodiesel engine's PM oxidation on conventional cordierite DPFs powders are lower than that of diesel engine's PM and carbon black because of unburned oxygenated molecule. The calculated apparent activation energy of biodiesel engine's PM and diesel engine's PM oxidize on conventional cordierite DPFs powders with pure air are in the range of 109-131 kJ/mole and 117-130 kJ/mole, respectively. It might be expected that smaller primary nanoparticle size of biodiesel engine's PMs and bio-oxygenate unburned hydrocarbon can promote more PM oxidation rate during vehicle's DPF regeneration process.

**Keywords :** Engine, Particulate Matter, Particulate Filter, Biodiesel, Oxidation Kinetics