Effect of Carbon Nanotubes Functionalization with Nitrogen Groups on Pollutant Emissions in an Internal Combustion Engine

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Abstract : Nanomaterials have been explored as alternatives to reduce particulate matter from diesel engines, which is one of the most common pollutants of the air in urban centers. However, the use of nanomaterials as additives for diesel has to overcome the instability of the dispersions to be considered viable for commercial use. In this work, functionalization of carbon nanotubes with amide groups was performed to improve the stability of these nanomaterials in a mix of 90% petroleum diesel and 10% palm oil biodiesel (B10) in concentrations of 50 and 100 ppm. The resulting nano fuel was used as the fuel for a stationary internal combustion engine, where the particulate matter, NOx, and CO were measured. The results showed that the use of amide groups significantly enhances the time for the carbon nanotubes to remain suspended in the fuel, and at the same time, these nanomaterials helped to reduce the particulate matter and NOx emissions. However, the CO emissions with nano fuel were higher than those ones with the combustion of B10. These results suggest that carbon nanotubes have thermal and catalytic effects on the combustion of B10.
Keywords : carbon nanotubes, diesel, internal combustion engine, particulate matter
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