

Morphology and structure of biofuel combustion generated particles

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Soot emission or carbon black has increasingly gained more attention in recent years. This can be attributed to its high toxicity characteristics which can cause serious human health problems such as lung cancer and pulmonary diseases. Generally, internal combustion engines have been introduced as the main source of these materials specially in urban areas. Furthermore, the particles in the range of nano size, so-called nano particles, or NPs, are counted as the most carcinogenic particles in term of the size which are produced during the combustion process. On the other hand, the production of NPs during combustion in compression ignition engines is an undeniable fact. Different methods have been proposed to reduce engine soot emissions such as DPF (Diesel particulate filter) which is attached to the engine exhaust line and microstructure and size of NPs were introduced as important parameters on its efficiency. In addition, biodiesel has become widely accepted as an appropriate substitution for diesel fuel, however, the using of biodiesel fuel may change engine emissions and performance characteristics. It is observed that biofuel fuel has higher soot oxidative reactivity, and it is more reactive than diesel fuel, which is an advantage for DPF regeneration. Smaller size of NPs in biodiesel fuel soot compared to diesel fuel is mentioned as a reason for this phenomenon. Filtration efficiency which is a crucial characteristic of the DPFs for biodiesel fuel and diesel fuel was found to be much different. These differences are attributed to the morphology of the produced soot of the fuel burning. The source of the biodiesel fuel is introduced as an impactful parameter on engine NPs morphology and size. Then in this study, the effects of biodiesel fuel on the combustion generated particles are discussed comprehensively.