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A COMPREHENSIVE REVIEW OF NANO ADDITIVES APPLICATIONS FOR ENHANCING PALM BIODIESEL PERFORMANCE IN INTERNAL COMBUSTION ENGINE

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Abstract:

Palm biodiesel is recognized as a promising alternative fuel for internal combustion engines (ICEs) due to its renewable origin, biodegradability, and potential to reduce greenhouse gas emissions. However, its lower energy density, higher viscosity, and limited oxidative stability restrict widespread utilization. The incorporation of nano additives into palm biodiesel has emerged as an effective strategy to enhance combustion characteristics, emission profiles, and engine efficiency. This review critically examines recent progress in nano additive applications for palm biodiesel, emphasizing their effects on fuel properties, engine performance, and emission behavior. In addition, it discusses prevailing challenges, assesses economic feasibility, and identifies future research directions for the sustainable deployment of nanoadditives in biodiesel-fueled ICEs.

Keywords: biodiesel, nano additives, performance, emission, palm biodiesel, I.C. Engine