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Waste to energy conversion using fast pyrolysis

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Ever increasing energy demand, continued exploitation of fossil fuel sources, uncertainty in the cost of petroleum-based fuels and the detrimental effects related to the use of fossil fuels on the environment have encouraged to search new and alternate sources of fuel for automobiles. In recent years the quantity of waste has increased significantly all over the world. Most of the wastes are inorganic, non-biodegradable nature and affects the landfill, so waste disposal has been a major problem in most of the countries. The conversion of useful energy from wastes can be divided into thermo-chemical and biological conversion. Thermo-chemical conversions are more suitable for converting the inorganic wastes into useful energy. There are several thermo-chemical conversion routes available for converting the waste into energy, such as pyrolysis, gasification, and combustion. The fast pyrolysis has added advantage compared to gasification and incineration and promising way to obtain diesel like fuel from the wastes. Most of the research works reveal that the pyrolysis fuel has best replacement for the fossil fuel but it has slightly higher engine out emissions compared to fossil fuel. These emissions are major threat to human health and living organisms and it has been minimized by the advanced technologies. Common rail direct injection (CRDI) is one of the appropriate methods to reduction in the engine out emissions by and enhances the engine efficiency. The thermal efficiency increased upto 36 to 40% and unburnt hydrocarbons, particulate matters, and carbon monoxide emissions are reduced by 55%, 50%, and 60% respectively at rated power, but NO emission is increased by 20%. The quantity of EGR and mode of Split Injection are predominant methods for controlling the NO_x emission. The high-pressure injection enhances the turbulence and homogeneity in the air-fuel mixture to obtain the better thermal efficiency as well as lower emissions.

Biography

R Anand serves as an Assistant Professor of Mechanical Engineering at National Institute of Technology, Trichy from May, 2007. His area of specialization is Internal Combustion Engines and it expands to the field of Waste to Energy, Alternative Fuels, Emission Control and Fuel Cells. His research oriented scholarship has facilitated him to publish 25 SCI international journals and presented papers in several international conferences besides presenting paper in ASME and SAE international conferences. He received Endeavour Fellowship from Australian Government. He has received the N K Iyengar Award from Institute of Engineers, India. Currently, he is undertaking projects received from DST-SERB, DST-UKERI and Institution of Engineers, India. Currently, he is undertaking Consultancy for Industry and Academics to support their research activities in the area of production of new alternative fuels, emission control strategies, fuel property determination and engine study. He is a Reviewer of many Elsevier, ACS, ASME and SAE journals.

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