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Bioenergy potential for power generation: Performance and emission of improvised biodiesel in microgasturbine

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Depletion of fossil fuel, environmental quality deterioration due to increasing fossil fuel utilisation and the soaring price of fossil fuel products have prompted intensified research efforts on alternative renewable sources of energy. Among the sources, biodiesel is the most pursued and promoted around the world. Several researches which have been done to evaluate the potential of biodiesel (First Generation Biodiesel – FGB) as an alternative fuel for gas turbine application found that biodiesel has few property drawbacks in terms of surface tension, viscosity and density which leads to inferior performance compared to diesel. A novel method of improving the biodiesel properties to be suitable for gas turbine application has been developed. The improved biodiesel is called Second Generation Biodiesel (SGB). This paper reports performance and emission of SGB for electrical power generation gas turbine application. The performance tests, in a 30 kW Capstone micro gas turbine up to 20% blend of second generation biodiesel (SGB) with distillate diesel, have shown improved thermal efficiency by 1% compared with first generation biodiesel (FGB) and distillate diesel. The emissions test during the micro gas turbine operation also has shown significant decrease especially in NO_x emission compared to FGB and distillate diesel.

Biography

Kumaran Palanisamy, a graduate mechanical engineer from Purdue University is a Senior Lecturer at Universiti Tenaga Nasional (UNITEN). He pursued his PhD studies at UNITEN, aimed at developing biodiesel fuel derived from waste cooking oil for power generation gas turbine application. He has 10 years working experience in electric power generation in a multinational electricity utility corporation in Malaysia, Tenaga Nasional Berhad. Recently, he has been appointed as Principle Researcher at Center for Renewable Energy at UNITEN and actively pursuing research on harnessing biogas energy potential from waste in particular, sewage and palm oil mill sludge.

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