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Thermoelectric Power Generation by recovering heat energy from the exhaust gases: A Green Technology approach

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Abstract : In recent years, an increasing concern of environmental issues of emissions, in particular global warming and the limitations of energy resources has resulted in extensive research into novel green technologies of generating electrical power. Among several options thermoelectric power generation offer a potential application in the direct conversion of exhaust gas into electrical power by using the Seebeck effect. Temperature gradient created by the exhaust gases of an automobile across a thermopile produces emf, which will be sufficient enough to drive some electrical appliance like radiator or to charge the battery directly, without the need for extra circuitry and power drawn from the engine. Using this concept an attempt has been made in the thermal engineering lab to produce power by using the exhaust gas of a twin cylinder diesel engine. Commercially available thermopiles i.e thermoelectric generators (TEGs) are used in the experimentation. Since the power generated by a single thermopile is not sufficient enough to run electrical appliance, two such thermopiles are used connected in series. With some alterations make to the exhaust pipe of the engine, Hot junction is created for the TEGs. Using engine cooling water line cold junction is provided for the TEG. With the temperature gradient of approx. 120^{o} centigrade created across the hot and cold junctions while the engine is operating at half full load, 5volts power is generated across the two TEGs connected in series. For testing and to establish the power generation, a mobile phone is successfully charged using this experiment.

Keywords: Thermoelectric power generation, exhaust gas recovery, direct energy conversion, electrical power, thermoelectric materials.

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