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PYROELECTRIC ENERGY HARVESTING USING AUTOMOBILE EXHAUST EMISSION

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ABSTRACT

This study presents the pyroelectric performance improvement by employing exhaust emissions from automobiles. Electric outputs through the material $BaSn_{0.03}Ti_{0.97}O_3$ are recorded after subjecting the surface of the sample for heating under infrared (IR) lamp and flowing water. The thickness of the automobile exhaust ink was nearly 36.5 μm on the sample surface. Observations shows significant improvements with open circuit voltage increase to five times, electric current enhances upto six times across 10 Ω resistor and nearly 17 times increment in harvested energy. The peak values of the open circuit voltage obtained was 0.48 and 2.21 V for uncoated and coated samples respectively. The electric current for the heating-cooling cycle of 2s represents a peak value of 1.51 μA when compared with uncoated sample with a value of 0.28 μA. Moreover, energy stored across the 10 μF capacitor founds an increment from 1.39 μJ for uncoated sample to 24.22 μJ for coated sample. The study proposes effective utilization of harmful automobile exhaust and harvesting of energy for low power electronics. Therefore, this study systematically investigates the pyroelectric energy potential of $BaSn_{0.03}Ti_{0.97}O_3$ ceramics by using automobile emission and compares it with similar class of materials.

Keywords: Pyroelectric, engine exhaust, energy harvesting