A report on

THERMOELECTRIC MATERIALS AND APPLICATIONS FOR ENERGY HARVESTING POWER GENERATION OF MAGNESIUM SILICIDE (MG_2SI) COMBUSTION SYNTHESIS

A Project report submitted for the partial fulfilment of the requirements for award of Degree of

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IN

MECHANICAL ENGINEERING

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CERTIFICATE

This is to certify that the project entitled "**Thermoelectric Materials and Applications for Energy Harvesting Power Generation of Magnesium Silicide (Mg_2si) Combustion Synthesis"** is the record of the work carried out by **MALLA TEJA SAI (18815A0336), YEDURI PRAKASH (18815A0375), REPAKA RAKESH KUMAR 18815A0352 and KANDREGULA RAMESH (18815A0323)** of final year B. Tech in the department of Mechanical engineering. This work is done for the partial fulfilment for the award of BACHELOR OF TECHNOLOGY during the year 2019-2020.

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ABSTRACT

Thermo electrics, in particular solid-state conversion of heat to electricity, is expected to be a key energy harvesting technology to power ubiquitous sensors and wearable devices in the future. The current study reports the swift synthesis of high strength nanocrystalline magnesium silicide (Mg2Si) doped with bismuth (Bi) of 0-0.025 at. % via spark plasma assisted combustion synthesis. The proposed synthesis approach is rapid (54 min) against the conventional liquid and solid state synthesis routes which warrants prolong duration. XRD and TEM studies reveal the in-situ evolution of Mg_2Si phase and substantial doping of Bi. The synthesized Mg_2Si compound exhibits higher density. Heat transfer variations in different flat plates studies were carried out on the doped Mg_2Si shows the excellent mechanical properties were studied and analysis of Using by ANSYS.

KEYWORDS: Thermoelectric, organic, energy harvesting, thin film

CLASSIFICATION: Energy Materials, Thermo-electronics / Thermal transport / insulators