

Piezoelectric Composite Modules for Sensing and Energy Conversion from Road

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Energy harvesting from road infrastructure is a new research territory that encompasses technologies that capture the wasted energy occurred at pavements, accumulate and store it for self-sustained highway monitoring, communications, illuminations, and for possibly converting the highways into electric energy generator. Several different piezoelectric design models to harvest such energy are evaluated by Finite Element Analysis (FEA) COMSOL under road conditions. A custom designed test bed is established to evaluate electromechanical energy conversion. The piezoelectric harvester designed showed that energy density exceeding $1 \mu\text{W}/\text{mm}^3$ is achieved. An EVI arbitrary wave AC/DC converter was designed to have optimized power conversion efficiency to 79.6%. The integration of self-sustained rechargeable power with programmable sensors, data loggers is also developed and demonstrated.

Acknowledgement: J. Helffrich, Applied Physics Division, Southwest Research Institute, S. Dessouky, A.T. Papagiannakis, and A. Montoya, faculty of Civil Engineering, University of Texas at San Antonio, are acknowledged for collaborative effort and for granting access to testing equipment.