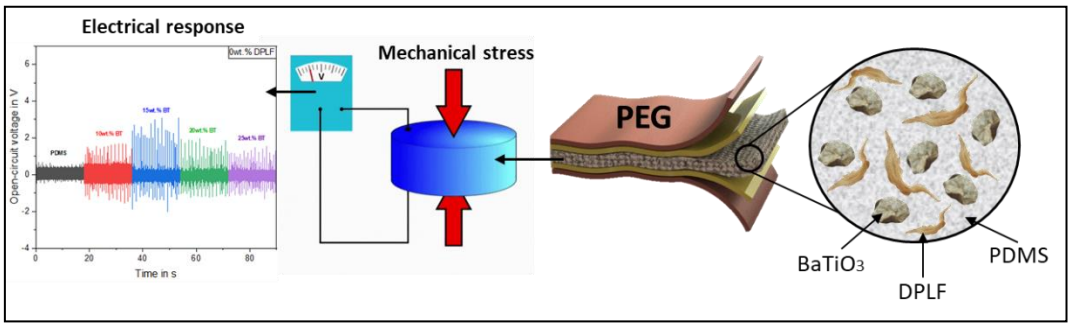
Research Project/Master
WS2024/25

Design and Characterization of Bio-Composite Piezoelectric Generators for Efficient Energy Harvesting

Project type: ✓ **Hardware** ▒ Software ✓ **Hardware/Software** ▒ Simulation ▒ Modelling

Project description:

Nanocomposite based energy harvesting converters have attracted considerable interest due to their adaptability, improved piezoelectric properties and high flexibility. This research aims to realize and investigate piezoelectric nanogenerator composites specifically designed for energy harvesting. Taking advantage of the special properties of piezoelectric materials, these composites function to convert mechanical vibrations or strains into electrical energy, providing a promising alternative for harvesting energy from ambient vibration sources. The project involves the fabrication of innovative composite structures incorporating bio-derived additives with the aim of reducing costs and valorizing organic waste. The goal of the project is to evaluate the effectiveness and reliability of piezoelectric composite energy harvesting devices using specific characterization techniques, including performance assessments under a variety of operating conditions. Finally, the goal of this research is to advance the field of sustainable energy through the development of adaptable and effective mechanical energy harvesting devices.



Methodology:

Tasks:

- Literature research on the state of the art of piezoelectric generators (PEG) and particularly those based on bio-resources.
- Realization of composites at different concentration levels.
- Analysis of PEG nanocomposite characterization techniques.
- Optimization of the concentration of additive components within the composite mixture.
- Implementation of the proposed methods for the characterization of the energy harvesters.
- Carry out experimental characterization.
- Documentation of the project.

Competences:

Self-learning and motivation / Data science handling knowledge (Origin or Excel, etc.) / Basic knowledge in materials, industrial processes, and quality control / Basic knowledge in materials behavior and mechanical characteristics.
From good to fluent in English language.

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