

Triboelectric Nanogenerators for energy storage units and powering electronics

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Research Area: Energy harvesting, energy storage, electrical circuit and power management.

Project Description:

Triboelectric nanogenerator (TENG) is a novel type of mechanical energy harvesting system which is based on the contact electrification and electrostatic induction. The TENG has shown promising features such as simple and area scalable design, robust performance, and multipurpose applications such as powering small scale electronics and self-powered sensing toward next generation Internet of Things (IoT). The TENG can generate an AC electrical output in the range of 5 W/m^2 under mechanical agitations with the frequency of around 2Hz. In this context, electrical circuit design can have a prominent importance in the TENG's electrical output management and optimizing the harvested energy from the TENG for the efficient charging of energy storage units and powering electronic devices.

In the past decade, our research center, Toronto Smart Materials & Structures (TSMART) lab at University of Toronto in collaboration with industrial partners has developed advanced nanostructured materials for numerous TENG applications namely vibration energy harvesting, water motion energy harvesting, biomechanical energy harvesting, and healthcare monitoring. We are looking for passionate candidates to join our team for our ongoing project on the development of TENGs with efficient performance for charging batteries and capacitors and powering small electronic devices (e.g. sensors). As the ultimate goal of this project, several circuits will be developed which can be used for capturing the highest possible amount of the energy generated from the TENGs. The research is performed in the TSMART lab in collaboration with outstanding researchers in MIE, MSE and BME departments. By joining our team, you will have the opportunity to perform research in our state of the art research labs in Canada, expand your lab skills, and fortify your academic resume by having contribution in academic publications.

Interested candidates should contact Prof. Hani E. Naguib (naguib@mie.utoronto.ca) for more information.