

## Design, Fabrication, and Study of Droplet Tube Based Triboelectric Nanogenerators

**Authors :** Yana Xiao

**Abstract :** The invention of Triboelectric Nanogenerators (TENGs) provides an effective approach to the sustainable power of energy. Liquid-solid interfaces-based TENGs have been researched in virtue of less friction for harvesting energy from raindrops, rivers, and oceans in the form of water flows. However, TENGs based on droplets have rarely been investigated. In this study, we have proposed a new kind of droplet tube-based TENG (DT-TENG) with free-standing and reformative grating electrodes. Both straight and curved DT-TENGs were designed, fabricated, and evaluated, including straight tubes TENG with 27 electrodes and curved tubes TENG of 25cm radius curvature- at the inclination of 30°, 45° and 60° respectively. Different materials and hydrophobicity treatments for the tubes have also been studied, together with a discussion on the mechanism and applications of DT-TENGs. As different types of liquid discrepant energy performance, this kind of DT-TENG can be potentially used in laboratories to identify liquid or solvent. In addition, a smart fishing float is contrived, which can recognize different levels of movement speeds brought about by different weights and generate corresponding electric signals to remind the angler. The electric generation performance when using a PVC helix tube around a cylinder is similar in straight situations under the inclination of 45° in this experiment. This new structure changes the direction of a water drop or flows without losing kinetic energy, which makes utilizing Helix-Tube-TENG to harvest energy from different building morphologies possible.

**Keywords :** triboelectric nanogenerator, energy harvest, liquid tribomaterial, structure innovation

**Conference Title :** ICTLT 2023 : International Conference on Tribology and Lubrication Technology

**Conference Location :** London, United Kingdom

**Conference Dates :** February 16-17, 2023