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PIEZO-TRIBOELECTRIC HYBRID NANOGENERATOR FOR RAINDROP ENERGY HARVESTING

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Piezoelectric and triboelectric energy harvesting devices have been developed in the past few years to convert mechanical energy into electrical energy as renewable energy. Piezoelectric nanogenerator is a converting energy source, by changing structural polarity of material when it is applied with stress. On the other hand, triboelectric nanogenerator is a method of generating electricity because two different materials created the electrostatic charges on their surface when they are brought into physical contact, and the electricity is built up due to a potential difference when they are separated. In this work, a piezo-triboelectric nanogenerator (PTENG) has been developed for harvesting energy from raindrops. The compositions are polydimethylsiloxane (PDMS) as piezo-triboelectric surface and silver paint or an aluminium tape as electrode. In addition, the surface of PDMS films are modified into a flat surface with 3 patterns, including like a lotus-leaf, micro-pillar, and like shark-skin. Polyvinyl alcohol (PVA) is used to replicate this pattern to make negative moulds, which act as templates for fabricating PDMS films. The PDMS films are fabricated by a spin-coating machine. Furthermore, the depth profile of PVA negative mould is measured by atomic force microscope (AFM). The AFM topologies reveal that the lower molecular weight and concentration is higher efficiency for replicating structures. Hydrophobic property of PDMS films are observed by the contact angle tester machine. The results show that micro-pillars pattern give the highest value of contact angle as meaning the most hydrophobic but it is not dramatically different from others. Field scanning electron microscope (FE-SEM) is used to examine the size and shape of PDMS surface structure. Finally, the electrical output of PTENG is measured using a programmable electrometer, a digital oscilloscope and a low-noise current preamplifer.

Biography

Atissun Kittilaksanon has completed his Bachelor's degree from King Mongkut's University of Technology Thonburi, major in Materials Engineering with 1st honours. Now, he is pursuing Master's degree of Polymer Science at the Petroleum and Petrochemical College, Chulalongkorn University. He is a student under supervision of Associate Professor Hathaikarn Manuspiya, she has published more than 30 papers in the worldwide journals such as Cellulose, Biomacromolecules, and International Journal of Adhesion and Adhesive.

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