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Electrical properties of triboelectric nano-generators based on textile substrate utilizing resin polarization layer

Young Pyo Jeon, Byung Ki Kong, Dae Hun Kim and Chaoxing Wu
Hanyang University, South Korea

Since Z. L. Wang's pioneer work was introduced, triboelectric nanogenerators (TENGs) have been extensively investigated to harvest electrical energy converted by mechanical energy in low frequency. The power generation of TENGs is significantly involved in the electrostatic force of friction layers because the contact between the frictional materials allows electron flows after the change on the electrostatic force of friction layers. In recent, the research on TENGs with various combinations of friction layers such as metals, Tafron, inorganic, organic materials and water have been conducted. However, the applications and new concept devices for TENGs are still limited and needed to investigate. Thus, we have suggested TENGs based polyurethane/polyester textile substrate to suggest new applications for TENGs. For the textile substrate, UV-curing resin deposited on the polyurethane/polyester textile substrate to improve the morphology of the textile substrate. We spin-coated the resin on the textile substrate and the textile substrate was exposed by 365 nm UV lamp for 1 hour. Scanning electron microscopy images show the surface of the textile substrate with and without the resin polarization layer. The TENGs based on polyurethane/polyester textile substrate containing Al electrodes and a polyimide friction layer are measured a vertical contact-separation mode and the TENGs exhibited a peak potential of over 100 V, which is about 10 times larger than that of the device without resin polarization layer. By further studies, flexible endurance and water resistance testes are carried to verify the distinction of the TENGs based on textile substrate. This research presents solution-processed TENGs based on polyurethane/polyester textile substrate with resin polarization layer and the power generation and the reliability of the TENGs utilizing resin polarization layer are significantly enhanced compared with the TENGs without the resin polarization layer.

Biography

Young Pyo Jeon has completed his PhD from Hanyang University and Postdoctoral studies from the Research Institute of Industrial Science at Hanyang University. He is the Team Leader of triboelectric nanogenerators in the nano quantum electronics laboratory, a member of the Korean Vacuum Society and the Korean Information Display Society. He has published more than 17 papers in reputed journals.

jyp83e@hanyang.ac.kr

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