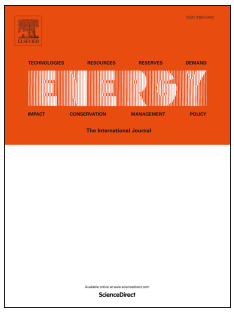
Accepted Manuscript



High-performance and cost-effective triboelectric nanogenerators by sandpaper-assisted micropatterned polytetrafluoroethylene

Anki Reddy Mule, Bhaskar Dudem, Jae Su Yu

PII: S0360-5442(18)31886-3

DOI: 10.1016/j.energy.2018.09.122

Reference: EGY 13816

To appear in: *Energy*

Received Date: 10 April 2018

Revised Date: 27 July 2018

Accepted Date: 18 September 2018

Please cite this article as: Mule AR, Dudem B, Yu JS, High-performance and cost-effective triboelectric nanogenerators by sandpaper-assisted micropatterned polytetrafluoroethylene, *Energy* (2018), doi: https://doi.org/10.1016/j.energy.2018.09.122.

High-performance and cost-effective triboelectric nanogenerators by sandpaper-assisted micropatterned polytetrafluoroethylene

*Anki Reddy Mule, Bhaskar Dudem, and Jae Su Yu**

Department of Electronic Engineering, Institute for Wearable Convergence Electronics, Kyung Hee University, 1732 Deogyeong-daero, Giheung-gu, Yongin-si, Gyeonggi-do 446-701, South Korea.

*Corresponding author. Email address: jsyu@khu.ac.kr (Prof. J. S. Yu)

ABSTRACT

We reported a facile, inexpensive, and high-performance triboelectric nanogenerator (TENG) designed by utilizing the micropatterned polytetrafluoroethylene (MP-PTFE) and aluminum (Al) as triboelectric materials with opposite tendencies. To reduce the fabrication cost as well as to enhance the contact area of PTFE, the micropatterns were formed on its surface by adopting a simple and cost-effective thermal imprinting lithography *via* sandpaper as a mold. Consequently, the micropatterns were successfully replicated on the PTFE from the low surface energy sandpaper mold, which does not require any surfactant coating and expensive high vacuum equipment. The proposed TENG device can convert mechanical energy into electricity by continuous contact and separation between the MP-PTFE and Al. The sandpapers with three grit sizes were employed and the effect of average diameter of micropatterns on the electrical output of TENG was analyzed. The MP-PTFE replicated from the sandpaper with a larger grit size can offer a high contact area between the electrodes, thus resulting in the highest electrical output of TENG. Additionally, the effect of external pushing force and load resistance on the output performance of the TENG device was investigated, including the device robustness.