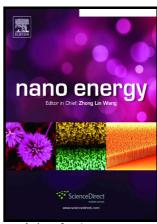
Author's Accepted Manuscript

Spring-Assisted Triboelectric Nanogenerator for Efficiently Harvesting Water Wave Energy

Tao Jiang, Yanyan Yao, Liang Xu, Limin Zhang, Tianxiao Xiao, Zhong Lin Wang



www.elsevier.com/locate/nanoenergy

PII: S2211-2855(16)30569-9

DOI: http://dx.doi.org/10.1016/j.nanoen.2016.12.004

Reference: NANOEN1655

To appear in: Nano Energy

Received date: 5 November 2016 Revised date: 29 November 2016 Accepted date: 4 December 2016

Cite this article as: Tao Jiang, Yanyan Yao, Liang Xu, Limin Zhang, Tianxiao Xiao and Zhong Lin Wang, Spring-Assisted Triboelectric Nanogenerator for Efficiently Harvesting Water Wave Energy, *Nano Energy* http://dx.doi.org/10.1016/j.nanoen.2016.12.004

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

ACCEPTED MANUSCRIPT

Spring-Assisted Triboelectric Nanogenerator for Efficiently Harvesting Water Wave Energy

Tao Jiang^{a,1}, Yanyan Yao^{a,1}, Liang Xu^a, Limin Zhang^a, Tianxiao Xiao^a, Zhong Lin Wang^{a,b}*

^aBeijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences; National Center for Nanoscience and Technology (NCNST), Beijing 100083, China

^bSchool of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0245, USA

*Corresponding author at: Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences; National Center for Nanoscience and Technology (NCNST), Beijing 100083, China. zlwang@gatech.edu (Z.L. Wang)

ABSTRACT

Ocean waves are one of the most promising renewable energy sources for large-scope applications. Triboelectric nanogenerator (TENG) has been demonstrated to effectively harvest water wave energy possibly toward large-scale blue energy. In this work, a kind of spring-assisted TENG was designed and investigated for harvesting water wave energy. The idea of introducing spring is to store the potential energy built during mechanical triggering for multiple cycles of conversion into electricity afterward, and transform a low frequency motion into a high frequency oscillation for improving the energy harvesting efficiency. The output performance of the basic unit was optimized by adjusting the motor acceleration and spring parameters including the rigidity and length. There exists an optimized spring rigidity or spring length to produce the highest performance. By using the spring, the accumulated charge of the TENG can be increased by 113.0%, and the translated electric energy or efficiency can be improved by 150.3%. Then four optimized basic units were connected in parallel and packaged into a sealed box to harvest the water wave energy. The present work could provide an approach to improving the output performance and efficiency of TENGs in harvesting low-frequency water wave energy.

Keywords: triboelectric nanogenerator, spring-assisted, water wave energy, blue energy

-

¹ These authors contribute equally to this work.

Download English Version:

https://daneshyari.com/en/article/5452471

Download Persian Version:

https://daneshyari.com/article/5452471

<u>Daneshyari.com</u>