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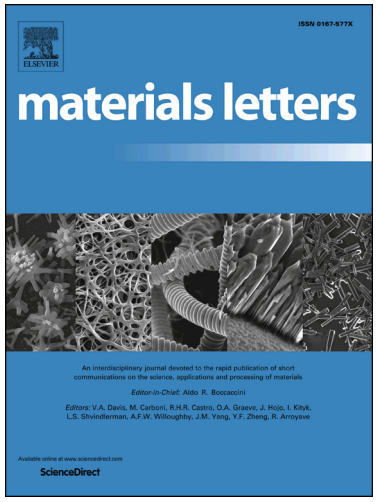

Electrically conductive carbon black/electrospun polyamide 6/poly(vinyl alcohol) composite based strain sensor with ultrahigh sensitivity and favorable repeatability

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PII: S0167-577X(18)31636-7
DOI: https://doi.org/10.1016/j.matlet.2018.10.068
Reference: MLBLUE 25110

To appear in: *Materials Letters*

Received Date: 23 August 2018
Revised Date: 9 October 2018
Accepted Date: 11 October 2018

Please cite this article as: P. Zhan, W. Zhai, N. Wang, X. Wei, G. Zheng, K. Dai, C. Liu, C. Shen, Electrically conductive carbon black/electrospun polyamide 6/poly(vinyl alcohol) composite based strain sensor with ultrahigh sensitivity and favorable repeatability, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.10.068

Electrically conductive carbon black/electrospun polyamide 6/poly(vinyl alcohol) composite based strain sensor with ultrahigh sensitivity and favorable repeatability

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Abstract: Carbon black (CB)/polyamide 6 (PA6)/ poly (vinyl alcohol) (PVA) electrically conductive polymer composites were fabricated by embedding conductive CB/electrospun PA6 fibrous mat into PVA matrix. Here, the electrospun PA6 fibrous network was applied as the skeleton to pre-construct conductive channels by decorating CB particles on the surfaces of PA6 fibers; the PVA was used as matrix to protect the pre-produced conductive network. For the strain sensing performances, a very high gauge factor (GF, 9706.9) has been achieved, showing a large sensitivity. Cyclic tension tests display that the conductive fibrous composite shows distinguishing sensing behaviors towards varying tensile strain. The strain sensor also has excellent repeatability and durability during long-term stretching-releasing cycles. This work provides a facile and novel strategy to develop strain sensors combined with high sensitivity and excellent stability for human health detections.

Keywords: Polymeric composites; Electrical properties; Microstructure; Sensors

1. Introduction

Wearable and flexible strain sensors have attracted tremendous attention owing to their application in the fields of medical devices, health monitoring, and human-machine interfaces [1, 2]. Unfortunately, conventional strain sensors cannot possess high sensitivity and excellent repeatability synchronously,

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