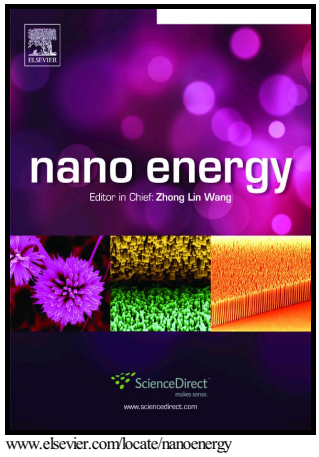

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PII: S2211-2855(17)30705-X
DOI: https://doi.org/10.1016/j.nanoen.2017.11.026
Reference: NANOEN2327

To appear in: *Nano Energy*

Received date: 23 July 2017
Revised date: 10 November 2017
Accepted date: 10 November 2017

Cite this article as: Masoud Seifikar, Björn P. Christian, János Volk, János Radó, István E. Lukács, Rolanas Dauksevicius, Rimvydas Gaidys, Vadim Lebedev, Antoine Viana and Eoin P. O'Reilly, Direct observation of spontaneous polarization induced electron charge transfer in stressed ZnO nanorods**© 2012 Published by Elsevier Ltd. Selection and/or peer-review under responsibility of Global Science and Technology Forum Pte Ltd, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2017.11.026

Direct observation of spontaneous polarization induced electron charge transfer in stressed ZnO nanorods

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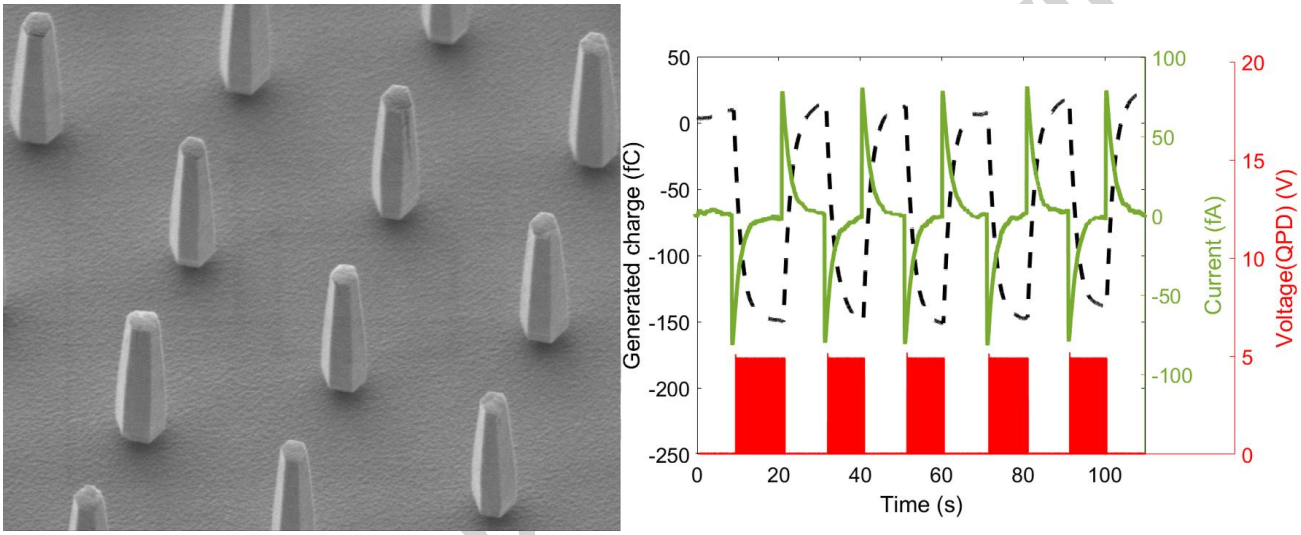
Abstract

We report here a theoretical and experimental study of the charge generated when a ZnO nanorod is subjected to external force and contacting on a timescale of order seconds. We show, for the samples considered, that the measured charge flow is over four orders of magnitude larger than expected based on the strain-induced piezoelectric response, and is comparable in magnitude to the spontaneous charge on the surface of an ideal nanorod. We present a defect-mediated electrostatic model to explain how the measured charge transfer can arise from the nanorod spontaneous polarization induced electron charge.

Graphical Abstract



Keywords: ZnO; nanowire; nanorod; piezoelectricity; spontaneous polarization; pressure sensor