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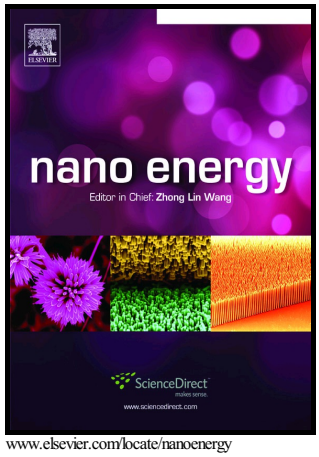

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PII: S2211-2855(18)30676-1
DOI: https://doi.org/10.1016/j.nanoen.2018.09.032
Reference: NANOEN3037

To appear in: *Nano Energy*

Received date: 23 July 2018
Revised date: 3 September 2018
Accepted date: 14 September 2018

Cite this article as: Hassan Askari, E. Hashemi, A. Khajepour, M.B. Khamesee and Z.L. Wang, Towards Self-Powered Sensing Using Nanogenerators for Automotive Systems, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2018.09.032

Towards Self-Powered Sensing Using Nanogenerators for Automotive Systems

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Abstract

Harvesting energy from the working environment of vehicles is important for wirelessly monitoring their operation conditions and safety. This review aims at reporting different sensory and energy harvesting technologies developed for automotive and active safety systems. A few dominant sensing and power harvesting mechanisms in automotive systems are illustrated, then, triboelectric, piezoelectric and pyroelectric nanogenerators, and their potential for utilization in automotive systems are discussed considering their high power density, flexibility, different operating modes, and cost in comparison with other mechanisms. Various ground vehicles' sensing mechanisms including position, thermal, pressure, chemical and gas composition, and pressure sensors are presented. A few novel types self-powered sensing mechanisms are presented for each of the abovementioned sensor categories using nanogenerators. The last section includes the automotive systems and subsystems, which have the potential to be used for energy harvesting, such as suspension and tires. The potential of nanogenerators for developing new self-powered sensors for automotive applications, which in the near future, will be an indispensable part of the active safety systems in production cars, is also discussed in this review article.

Graphical **Abstract:**