Energy scavenging nanogenerator finds power all around us

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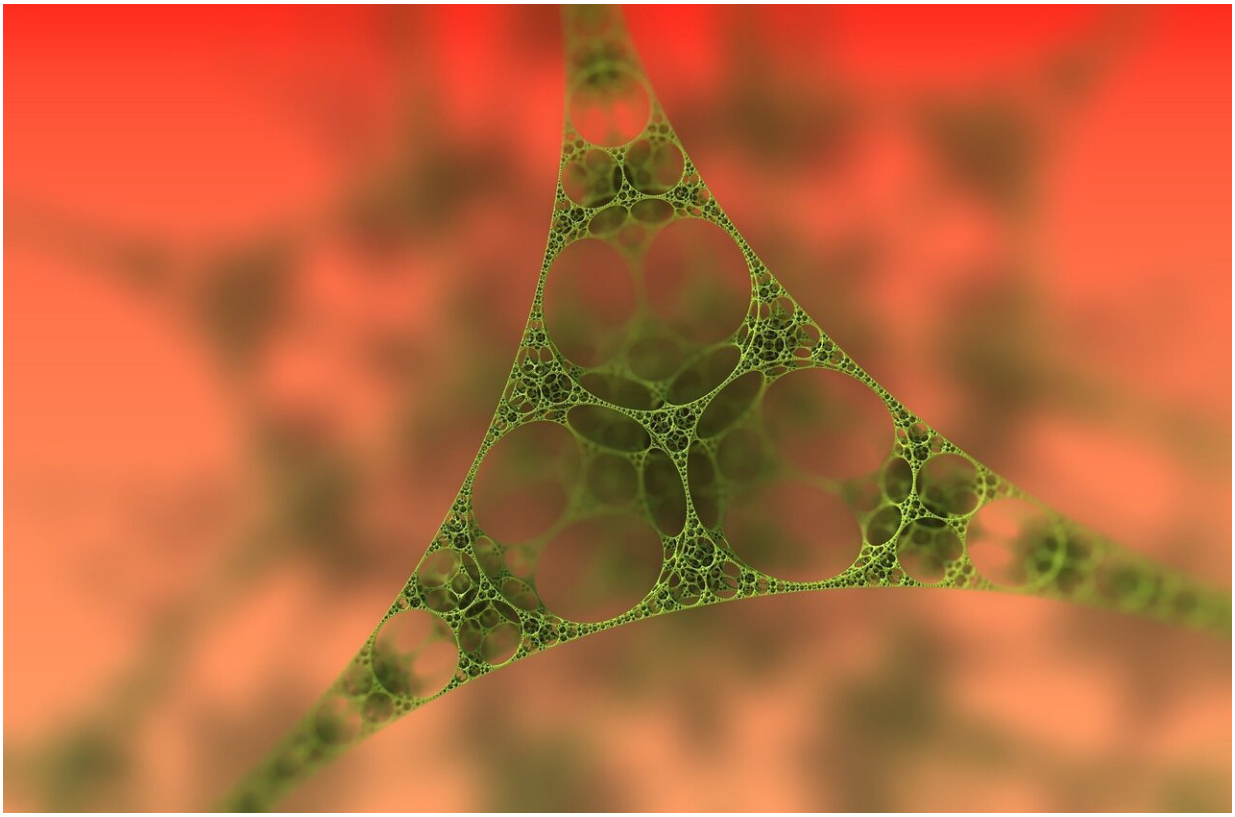

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Imagine a mobile phone charger that doesn't need a wireless or mains power source. Or a pacemaker with inbuilt organic energy sources within the human body.

Australian researchers led by Flinders University are picking up the challenge of "scavenging" invisible power from low-frequency vibrations in the surrounding environment, including wind, air or even contact-separation energy (static electricity).

"These so-called triboelectric nanogenerators (or TENGs) can be made at low cost in different configurations, making them suitable for driving small electronics such as personal electronics (mobile phones), biomechanics devices (pacemakers), sensors (temperature/pressure/chemical sensors), and more," says Professor Youhong Tang, from Flinders University's College of Science and Engineering.

Further research aims to further develop this renewable form of energy harvesting by designing simple fabrication from cheap and sustainable materials, with high efficiency.

"They can use non-invasive materials, so could one day be used for implantable and wearable energy harvesting aims," says Ph.D. candidate Mohammad Khorsand, co-lead author on recent papers in international journal Nano Energy.

The latest paper uses AI-enhanced mathematical modeling to compare the function of the number of segments, rotational speed and tribo-surface spacing of an advanced TENG prototype to optimize the storage and performance.

The researchers, with colleagues at the University of Technology Sydney and elsewhere, are working to improve power generation of TENGs and store the generated power on supercapacitor or battery.

"We have been able to effectively harvest power from sliding movement and rotary motion which are abundantly available in our living

environment," says Professor Tang.

The latest paper, "Artificial intelligence enhanced mathematical modeling on rotary triboelectric nanogenerators under various kinematic and geometric conditions," (2020) by Mohammad Khorsand, Javad Tavakoli (University of Technology Sydney), Haowen Guan and Youhong Tang, has been published in *Nano Energy*.

More information: Mohammad Khorsand et al. Artificial intelligence enhanced mathematical modeling on rotary triboelectric nanogenerators under various kinematic and geometric conditions, *Nano Energy* (2020). DOI: 10.1016/j.nanoen.2020.104993

Mohammad Khorsand et al. Simulation of high-output and lightweight sliding-mode triboelectric nanogenerators, *Nano Energy* (2019). DOI: 10.1016/j.nanoen.2019.104115

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