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## **IIT Delhi Researchers Develop Device to Generate Electricity from Raindrops, Ocean Waves**

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IIT Delhi researchers have designed and fabricated a device that can generate electricity from water drops, raindrops, water streams, and even from ocean waves using “Triboelectric Effect” and “Electrostatic Induction”. The device is called “Liquid-solid Interface Triboelectric Nanogenerator”. The generated electricity can be stored in batteries for further use.

The device has a very simple structure consisting of specially designed nanocomposite polymers and contact electrodes and can generate a few Milliwatt (mW) power, which is sufficient to power small electronic devices like watches, digital thermometers, radio frequency transmitters, healthcare sensors, pedometers. When compared to conventional methods, such as the use of the piezoelectric effect, the present device can generate significantly more electricity.

Prof. Neeraj Khare from the Department of Physics and his group at the Nanoscale Research Facility (NRF), [IIT Delhi](#), have been working on harvesting electrical energy from to be wasted mechanical vibrations using the triboelectric effect. The group has filed an Indian patent on the various aspects of the use of ferroelectric polymer for harvesting mechanical energy including the present device.



Liquid-solid Interface Triboelectric Nanogenerator.

“Triboelectric effect is a known phenomenon for a long time, and in this effect, charges are generated when two surfaces are in friction. The best example we see are sparkling lights when we move the blankets/jackets. It is only lately that it has been extensively investigated as a practical alternative for energy harvesting,” said Prof. Neeraj Khare, Physics Dept., IIT

Delhi.

In the recently published work of Prof. Khare and Dr. Huidrom Hemojit Singh in “Advanced Materials Interfaces” (Vol.8, Issue No.12, 2170068 (2021)), it is demonstrated that water drop rolling over the surface of the device generates electricity. The research paper is listed in “HOT TOPIC: Surfaces and Interfaces” and, also has been highlighted on the cover page of the journal. (Research paper link: <https://doi.org/10.1002/admi.202100032>). The Ministry of Electronics and Information Technology (MeitY) and the Department of Science and Technology (DST), Government of [India](#), have supported the research work under NNetRA project.

The researchers successfully incorporated nanostructures into a polymer matrix, which enhanced the film's surface roughness, polarizability, and hydrophobicity, among other characteristics, as a result. Due to the enhancement in the above property, the flexible film is used to fabricate the device where raindrops have just to slide down and can generate electricity. The artificially created rough surface allows to generate more charge and superhydrophobic properties of the solid surface help to roll the water drop without getting stick to the surface.

The IIT Delhi research team also explored the underlying mechanism of the electricity generated when the water drop comes in contact with the solid surface and it is shown that saline water drops generate more electricity.

The researchers also showed that the device can even work with ocean waves, where the water is saline, and through the ocean waves contacting the surface of nanocomposite polymer film, electricity is generated.

Read the [original article](#) on Indian Institute of Technology Delhi.