

IIT-I DEVELOPS DEVICE THAT GENERATES POWER USING JUST WATER, EVAPORATION

Our Staff Reporter

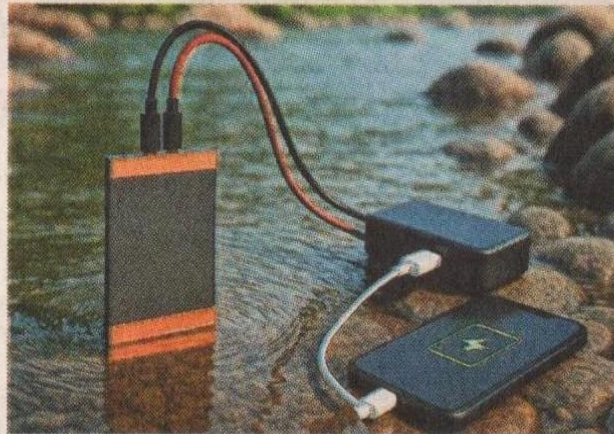
INDORE

Indian Institute of Technology Indore (IIT Indore) has developed a device that produces electricity using nothing but water and air—without the need for sunlight, batteries or moving parts.

The device silently taps into the natural process of water evaporation to extract thermal energy from the atmosphere, converting it into clean and sustainable electricity for small electronic devices.

This pioneering research comes from the Sustainable Energy and Environmental Materials (SEEM) Lab at IIT Indore, led by Prof Dhirendra K. Rai and his research team member, Khushwant Singh.

At the heart of the invention is a specially engineered membrane made of graphene oxide (a layered form of carbon) combined with zinc-



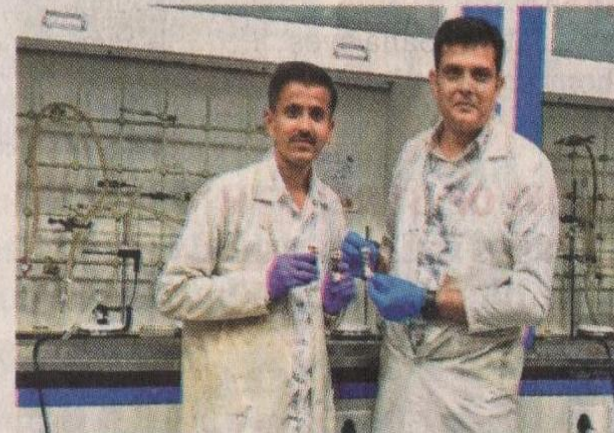
The device

imidazole, a stabilising compound. When the membrane is partially immersed in water, it begins generating electricity as water travels upward through microscopic channels and evaporates. This evaporation-driven movement separates positive and negative ions at opposite ends of the membrane, creating a steady voltage.

A single membrane of 3×2 cm² can generate up to 0.75

volts, while multiple membranes can be combined to scale up power output. Remarkably, the device works not only with clean water but also with saline or muddy water, retaining stability for months. Its versatility makes it ideal for regions with unreliable electricity or limited access to power.

Potential applications range from powering environmental sensors in forests and farms to providing emergency lighting



Research team

during blackouts or supporting low-power medical wearables in remote clinics. Unlike solar panels, the device works indoors, at night, and under cloudy conditions. Lightweight, portable, and compatible with even unfiltered water, it promises a robust solution for challenging environments.

Prof Suhas Joshi Director IIT Indore said, 'This innovation is a testament to IIT Indore's vision of creating

broader vision of his team and said "Think of it as a self-charging power source, fueled by nothing more than air and water. As long as evaporation continues, the device generates electricity—quietly, cleanly, and sustainably. Our aim was to design a solution that is both affordable and effective, so it can one day find real-world use in rural and off-grid areas."

Looking ahead, the team plans to optimise costs by using clay-based compounds and common minerals, making the design suitable for large-scale manufacturing.

"This device aims to fill critical gaps by powering small devices where other sources fail—acting as nature's own trickle charger. Future applications could even extend to energy-generating smart textiles or self-powered walls that run indoor sensors," said Rai.

knowledge that matters to society. By turning the simple phenomenon of water evaporation into a dependable power source, our researchers have opened new pathways for sustainable technologies. Such ideas can transform lives, especially in rural and underserved communities, and reaffirm the role of science in building a cleaner and more equitable future.'

Rai highlighted the