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IIT-I devices solar-run affordable water purification mechanism for coastal areas

TIMES NEWS NETWORK

Indore: Indian Institute of Technology (IIT), Indore engineered an economical water purification mechanism to facilitate access to pristine drinking water in remote and coastal regions where seawater is plentiful and conventional energy resources are limited.

The technology, based on Interfacial Solar Steam Generation (ISSG), harnesses solar energy to desalinate seawater, incorporating sustainable methodologies to optimise water treatment efficiency whilst minimising environmental impact. A team spearheaded by Professor Rupesh Devan of IIT Indore amalgamates solar energy with photothermal materials to purify water efficiently and economically.

Professor Suhas Joshi, director, IIT Indore, said, "Unlike traditional desalination processes such as reverse osmosis, which are energy-intensive and infrastructure-heavy, ISSG is a simpler and low-energy alternative. When exposed to sunlight, the photothermal material rapidly heats, causing the water to evaporate while leaving salts and contaminants behind. The resulting steam is condensed into purified water, making the process efficient and environmentally friendly."

EUREKA MOMENT

The researchers formulated specialised inks utilising metal oxide and carbide materials to surmount challenges like hydrophobicity in conventional carbon-based photothermal materials. These inks efficiently absorb solar radiation and transmute it into thermal energy, generating steam directly from saltwater at the air-water interface without necessitating external energy sources.

Professor Devan said, "Our goal was to develop a scalable and cost-effective water purification method. By utilising metal oxide-based inks, we achieved high evaporation rates, essential for practical applications. The technology is particularly suitable for remote and coastal areas where seawater is abundant and conventional energy resources are scarce. We are refining the inks for broader use, including integrating them into ISSG-based desalination systems for deployment in real-world scenarios."

The research team is also working on treating wastewater from the dye and textile industries. Furthermore, the researchers are developing multi-functional systems that integrate desalination with energy generation.