Salt Water to Safe Water Powered by the Sun:
IITI brings a Ray of Hope in Green Innovation

IIT Indore have developed a groundbreaking technology to provide cost-effective and sustainable water purification system, particularly for remote and underserved regions. Based on advanced materials and solar-driven techniques, this innovative system offers an eco-friendly solution to ensure access to clean and safe drinking water while reducing costs and minimizing environmental impact.

Water, a vital resource for all forms of life, is essential for health and societal well-being. With the increasing demand for freshwater worldwide, new water treatment methods like Interfacial Solar Steam Generation (ISSG) have gained prominence. ISSG uses solar energy to desalinate seawater, integrating sustainable techniques to enhance water treatment efficiency with minimal environmental harm.

A team led by **Prof. Rupesh Devan** at IIT Indore has made significant progress in desalinating saline water using ISSG technology. Their method combines solar energy with advanced photothermal materials to efficiently and economically purify water. The researchers have developed specialized inks using metal oxide and carbide materials to overcome challenges like hydrophobicity in conventional carbon-based photothermal materials. These inks absorb solar radiation effectively and convert it into heat, producing steam directly from saltwater at the air-water interface without requiring external energy sources.

Prof. 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.”

Prof. Devan said “Our goal was to develop a scalable and cost-effective water purification method. By utilizing 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.”

Beyond desalination, the team is exploring other applications, such as treating wastewater from the dye and textile industries. Moreover, the researchers are working on multi-functional systems that combine desalination with energy generation. These systems aim to produce clean water, generate electricity, and harvest residual salts for reuse, making the technology more economically viable and environmentally sustainable.