Free Press (Indore), 30th July 2025, Page – 01 & Contd. 08

Window to the Future

IIT-Indore's smart glass may soon replace curtains

Our Staff Reporter
INDORE

Imagine a window that tints itself when the sun gets too harsh, or clears up on a cloudy day—all without you lifting a finger. Researchers at IIT Indore are making this vision a reality through a cutting-edge smart glass project that could soon transform the way we use windows in our homes and offices.

Under the guidance of Professor Suman Mukhopadhyay from the Department of Chemistry and Professor Rajesh Kumar from the Department of Physics, this innovation is being developed by Dr. Sayantan Sarkar as part of the Translational Research Fellowship (TRF) scheme. The team has already achieved promising results in the lab, with their findings published in the prestigious journal ACS Applied Materials and Interfaces. The smart glass is made by applying a special viologen-based polymer (POP) coating onto glass using techniques like spray-coating and dip-coating. This ensures the layer is smooth, durable, and consistent.

Continued on | P8

Prof Suman Mukhopadhyay

Prof Rajesh Kumar

ELECTRIC SIGNALS CONTROL LIGHT & HEAT WITH A COLOUR SHIFT

IIT Indore's smart glass acts like an electronic curtain, adjusting light and heat with a small electric current. The secret lies in a new viologen-based porous organic polymer (POP), designed to be low-cost, durable, and scalable. These POPs quickly shift colour and transparency, blocking sunlight when it's hot and letting it in when it's cool—reducing the need for air conditioning and artificial lighting.

IIT-Indore's smart glass...

The coated glass is then placed between two transparent electrodes—ultra-thin, nearly invisible metal films that react to electric signals.

The team is currently testing small samples to measure how quickly the glass changes colour, its clarity, and how well it performs under real-world conditions like sunlight, heat, and daily wear. What makes this project stand out is its practical focus: the researchers are actively collaborating with industry partners to make sure the glass can be mass-produced using existing factory systems—no major overhauls required.

Unlike conventional curtains or window films, this smart glass adapts automatically to its environment, providing comfort, privacy, and energy savings—all with a sleek, modern aesthetic.

Professor Suhas S. Joshi, Director of IIT Indore, summed up the institute's vision: "At IIT Indore, we are dedicated to transforming academic research into technologies that benefit society. The smart glass project is a fine example of interdisciplinary collaboration aimed at achieving sustainability and national progress."

Professor Mukhopadhyay added, "This technology shows how fundamental chemistry can lead to scalable solutions. The viologen-based polymers enable quick and reliable colour change, which can redefine how we design energy-efficient buildings."

Professor Rajesh Kumar noted, "By blending material science with applied physics, we've created a responsive glass that's not just a lab concept—it's ready for real-world use. It has the potential to replace traditional windows very soon."

As India advances towards its green energy and smart infrastructure goals, innovations like IIT Indore's smart glass could play a vital role. Beyond being a technical feat, this project is a clear example of how academic research can light the way to sustainable, real-world change.

Contd. 08