Bengaluru Scientists develop smart switchable window that can 'fog' on demand

Scientists from the Centre for Nano and Soft Matter Sciences (CeNS), Bengaluru have developed an electrically switchable device that can be flipped between transparent and translucent modes.

The device titled 'Fog on-demand' was developed by Dr S. Krishna Prasad and his group from CeNS, Bengaluru, an autonomous Science & technology Institute under Department of Science & Technology. It can be changed from transparent to scattering states by the application of an electric field and would be useful as screens for windows along with applications in household, healthcare, privacy creation, smart displays, and saving energy. Currently, the inventors are in dialogue with a Bangalore-based industry to carry out the field tests of the basic design of this device.

The device involves the principle of nano-level phase separation of two specifically chosen soft materials (liquid crystal and a polymer) with tailor-made refractive index values. The situation is similar to the atmospheric fog wherein the two materials – water droplets and air – satisfy similar conditions.

An applied electric field chooses between the two situations, of matching or mismatched indices between the polymer and liquid crystal. This electric effect results in an optical output, which at the flip of a switch, alters between scattering and transparent states of the device. Encapsulation of this active material between glass sheets or flexible substrates leads to smart switchable windows which have a wide range of possible applications spanning household, healthcare, privacy creation, smart displays, and energy saving domains.

The currently available smart switchable windows have a major drawback that the operating voltage is not only high but is temperature-dependent as well. This places stringent demand on the control circuitry both in terms of the power level as well as compensation for the ambient temperature change.
The smart switchable window developed by Dr. S. Krishna Prasad and his group can simultaneously overcome both these deficiencies. Besides these advantages, these devices are less prone to damage due to mechanical shocks.