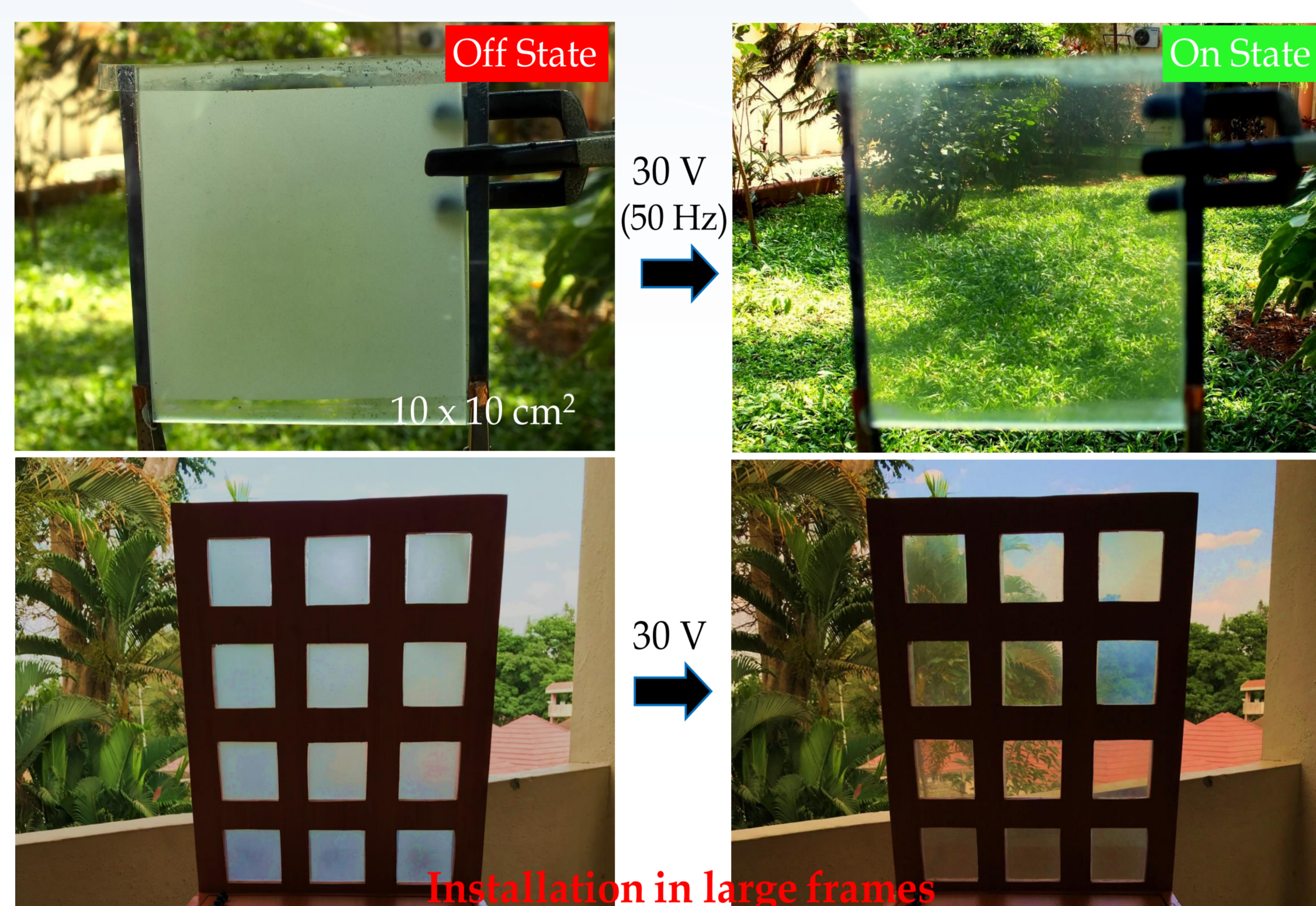




Affordable Smart Window by using ITO free Transparent Electrodes

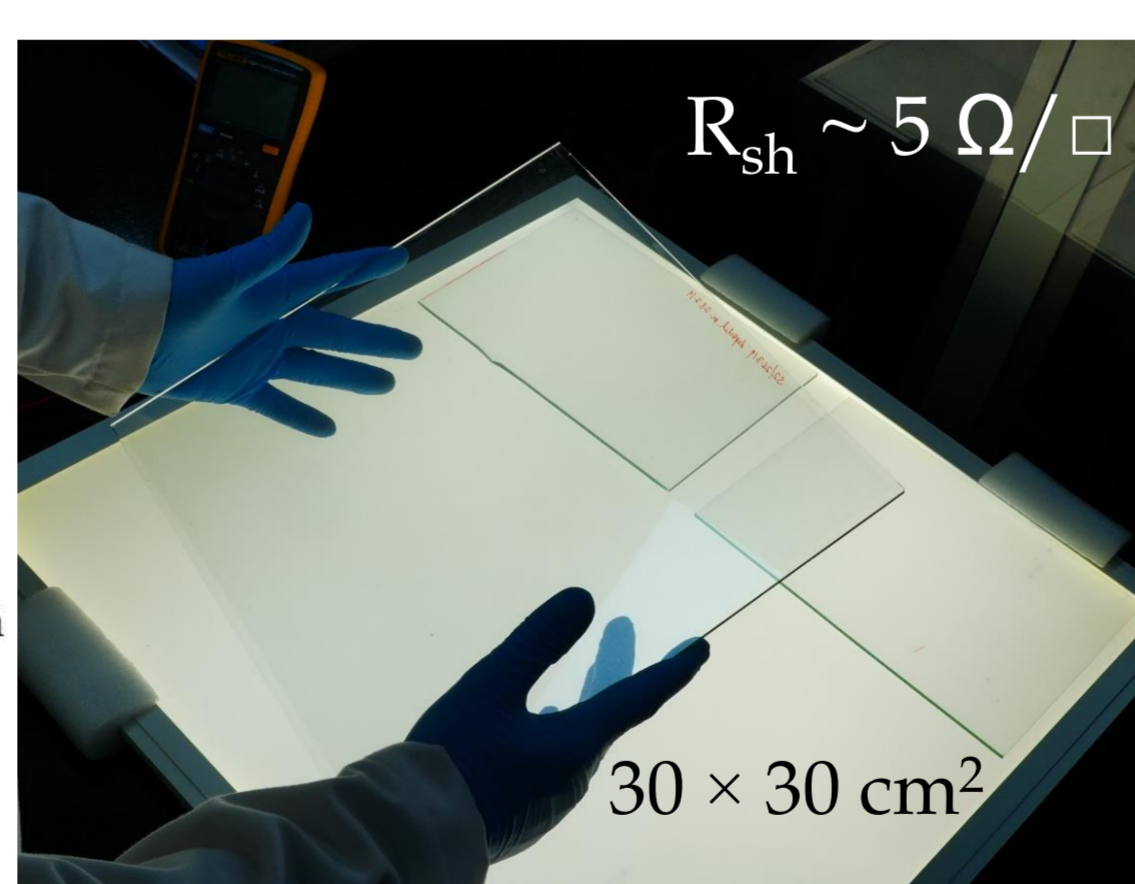
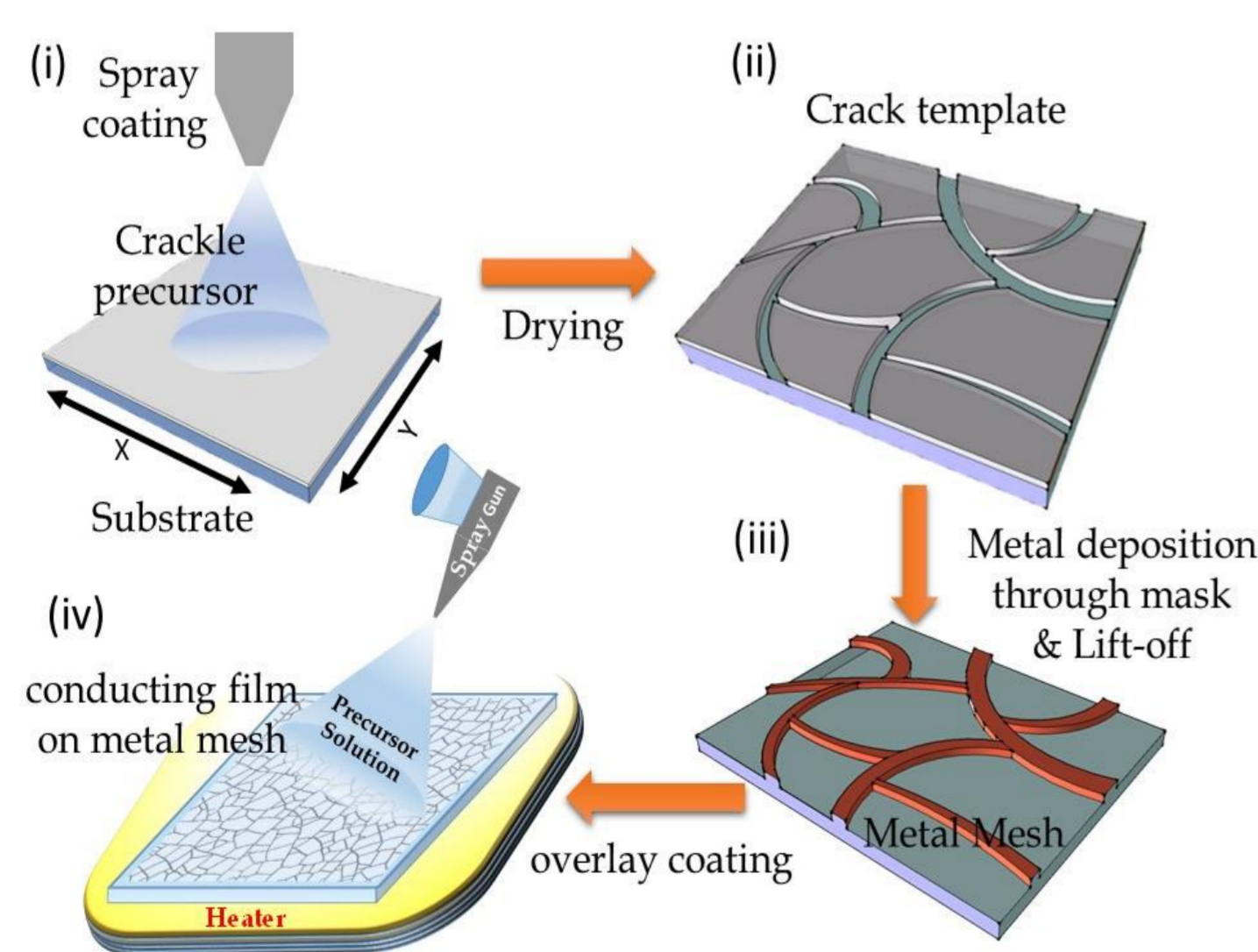
There is a great demand for energy saving smart partitions to serve as wide area switchable gates for light transaction across defined spaces at offices, public locations as well as homes. Partitions or windows that are in use presently, are simply transparent at best and the desired degree of see-through visibility is achieved with permanent fixtures such as screens, curtains or such combinations. We have fabricated a Polymer dispersed liquid crystal (PDLC) base smart window.



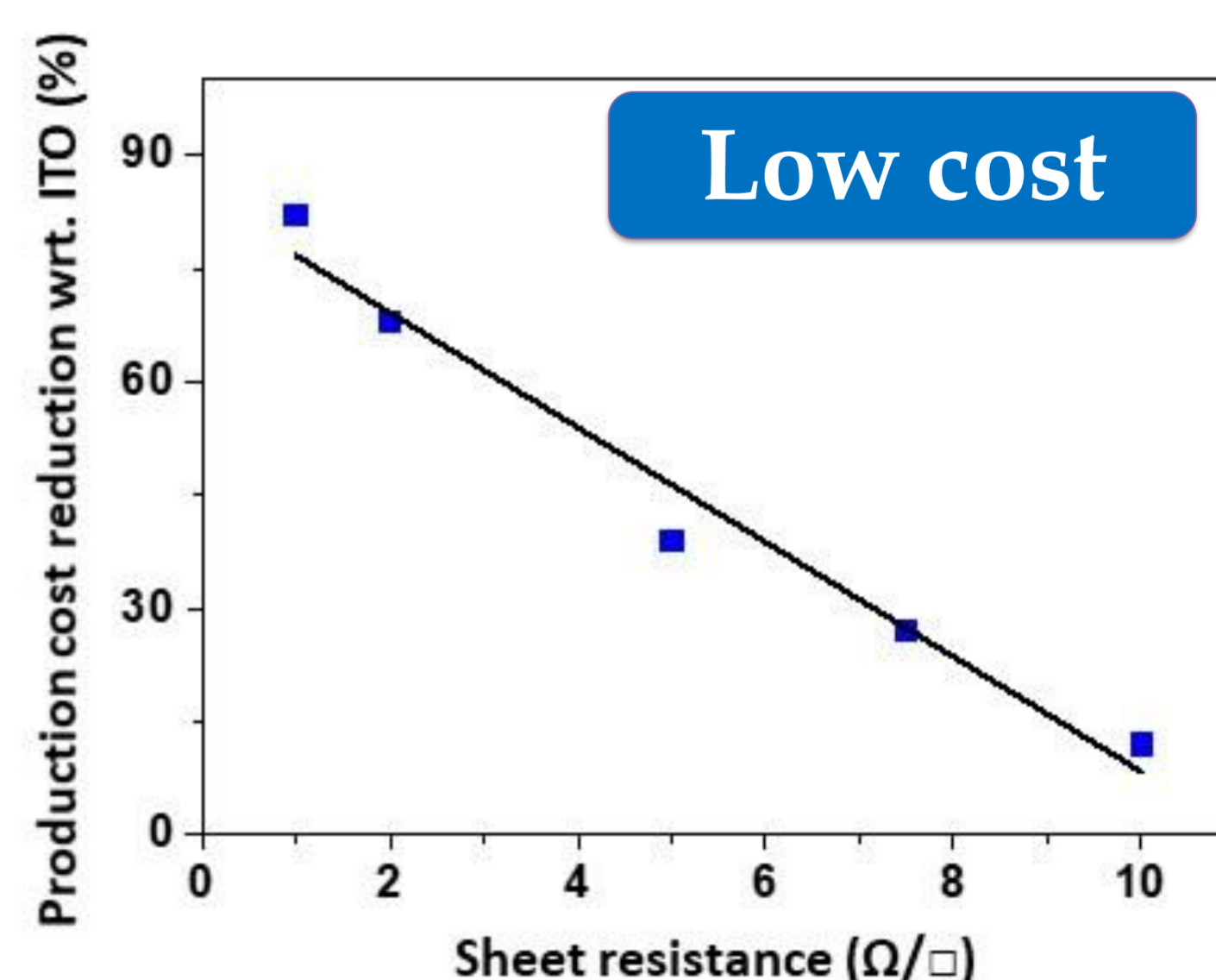
The device consists of a liquid crystal (LC) layer sandwiched between two transparent conducting electrodes (TCEs). The LC layer contains micro-droplets of LC dispersed in a NOA-65 polymer matrix. Typically, due to the random orientation of LC droplets and refractive indices (RI) mismatch between the LC and polymer matrix, the layer scatters incident light, resulting in a opaque state.

However, as soon as a particular voltage (~AC 30V, 50Hz) is applied between the two TCEs, LC droplets get oriented along the electric field direction causing a refractive index matching between the LC and the polymer and thereby create a low scattering or transparent state. Commercial devices are comprised of ITO as the TCE which is expensive. Here, we have used an alternative TCE (cheaper) based on Al micro-mesh coated with SnO₂.

Parameters		Values
Transmittance (%)	OFF	0
	ON	70
Haze (%)	OFF	97
	ON	30
Operating voltage and current	OFF	0
	ON	30 V AC, 5 A
Switching Speed	OFF - ON	13 ms
	ON - OFF	161 ms
Device color	OFF	Smoky white
	ON	Transparent



Digital Photograph of the transparent electrode



It is envisaged that this PDLC device, consisting the new class of electrodes, has the potential to be commercialized in applications such as- automobile and modern infrastructure development industry due to its easy fabrication steps and low cost.

Contributors: Indrajit Mondal, Mukhesh K. G., Dr. Ashutosh K. Singh, Prof. G. U. Kulkarni