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Switchable Solar Window Devices Based on Polymer Dispersed Liquid Crystals[1] JOSEPH MURRAY, DAKANG MA, JEREMY MUNDAY, University of Maryland — Windows are an interesting target for photovoltaics due to the potential for large area of deployment and because glass is already a ubiquitous component of solar cell devices. Many demonstrations of solar windows in recent years have used photovoltaic devices which are semitransparent in the visible region. Much research has focused on enhancing device absorption in the UV and IR ranges as a means to circumvent the basic tradeoff between efficiency and transparency to visible light. Use of switchable solar window is a less investigated alternative approach; these windows utilize the visible spectrum but can toggle between high transparency and high efficiency as needed. We present a novel switchable solar window device based on Polymer Dispersed Liquid Crystals (PDLC). By applying an electric field to the PDLC layer, the device can be switched from an opaque, light diffusing, efficient photovoltaic cell to a clear, transparent window. In the off state (i.e. scattering state), these devices have the added benefits of increased reflectivity for reduced lighting and cooling costs and haze for privacy. Further, we demonstrate that these windows have the potential for self-powering due to the very low power required to maintain the on, or high transparency, state.

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