Solid-state controllable light filter may protect preterm infants from disturbing light

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Preterm infants appear to mature better if they are shielded from most wavelengths of visible light, from violet to orange. But it has been a challenge to develop a controllable light filter for preterm incubators that can switch between blocking out all light—for sleeping—and all but red light to allows medical staff and parents to check up on the kids when they're awake. Now, in a paper accepted for publication in *Applied Physics Letters*, a journal of the American Institute of Physics, researchers describe a proof-of-concept mirror that switches between reflective and red-transparent states when a small voltage is applied.

The research team had previously identified a magnesium-iridium reflective thin film that transforms into a red-transparent state when it incorporates protons. Providing those protons in a way that is practical for preterm incubators, however, was the challenge. The typical method—using dilute hydrogen gas—is unacceptable in a hospital setting. So the team created a stack of thin films that includes both an ion storage layer and the magnesium-iridium layer: a voltage drives protons from the ion storage layer to the magnesium-iridium layer, transforming it into its red-transparent state. Reversing the voltage transforms it back into a reflective mirror.

The researchers report that the device still allows some undesirable light wavelengths through, but a force of just 5 V changes the device's state in as little as 10 seconds. The researchers are now looking at other materials to improve color filtering and switching speed.

More information: "Controllable light filters using an all-solid-state switchable mirror with a Mg-Ir thin film for preterm infant incubators," is published in *Applied Physics Letters*. apl.aip.org/resource/1/applab/v102/i16/p161913_s1

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