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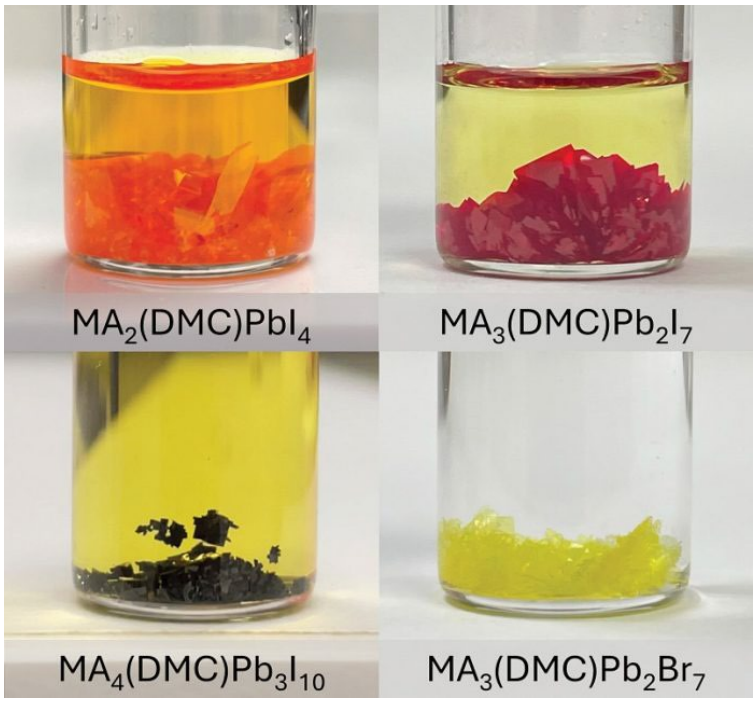
Scientists create color-changing materials for smart technologies



NTU's novel perovskites. Credit: NTU Singapore.

Scientists at Nanyang Technological University (NTU) have created a new kind of material that changes color when heated, which could lead to exciting new technologies.

These materials, known as 2D halide perovskites, are used in devices like solar panels and light-emitting diodes (LEDs).

The team, led by Associate Professor Nripan Mathews from NTU's School of Materials Science and Engineering, developed four unique types of these materials.

Their findings were recently published in the prestigious *Journal of the American Chemical Society*.

The breakthrough was achieved by Dr. Ayan Zhumekenov, a research fellow at NTU and the lead author of the study.

He used an innovative and environmentally friendly method to create the new materials.

By adding dimethyl carbonate, a non-toxic solvent, to methylammonium-based crystals, the researchers were able to design perovskites with fascinating new properties.

One key feature of these materials is their adjustable “band gap.” The band gap determines the color of the material and how it interacts with light.

By changing the ratio of dimethyl carbonate to methylammonium in the crystal structure, the team found they could tune the band gap, allowing precise control over the material’s color.

This ability is important for applications in solar cells, LEDs, and other devices that depend on light and energy.

The most exciting discovery was the color-changing ability of one of these perovskites. When heated to 80°C, the material changes from orange to red.

When cooled to room temperature, it switches back to orange. This “thermochromic switching” behavior is not only dynamic but also highly durable—the researchers successfully repeated the color change 25 times without any damage to the material.

This discovery could lead to new uses for these materials in smart technologies. For example, they could be used in coatings that change color based on temperature, or in heat-sensitive inks for security applications.

The researchers believe their work opens up new possibilities for 2D halide perovskites, particularly in the field of optoelectronics, which includes technologies like sensors, displays, and solar energy systems.

This innovation highlights the potential of combining science and sustainability to create materials that could transform everyday life.

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