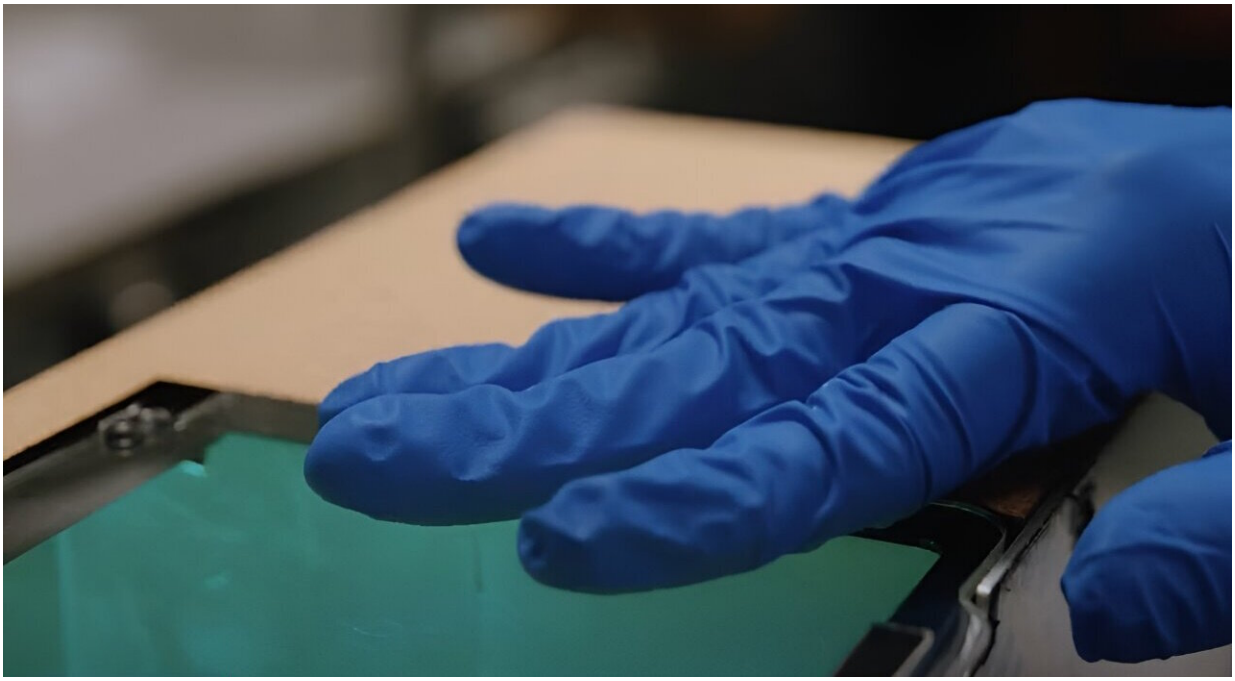
Cool paint made sustainable using recycled plastics

June 5 2024



An NTU research team has successfully developed new methods to create a type of "cool paint" using recycled plastics—namely acrylic, old PVC pipes and polystyrene foam—and barium sulfate, offering a sustainable and efficient alternative to new plastics.

The NTU methods not only help in cooling temperatures in tropical

environments, but also contribute to effective plastic waste management.

In the first method (sol-gel), the research team used recycled plastics and mixed them with barium sulfate ($BaSO_4$), to create their cool paint.

A 24-hour test on the roof-top of a building in Singapore showed that the newly created coating can reach 1.2° C below the surrounding air temperature when exposed to direct sunlight. At night, the coating could reach 3° C below the ambient temperature. The coating can reflect about 97.7% of sunlight and emits 95% of its heat in the infra-red band.

In a second method (phase inversion), the team also used recycled plastics and barium sulfate to make the cool paint but focused on making the recycled plastics porous by creating tiny air-filled holes in them during the production process. This is because air pores help to scatter sunlight across its spectrum.

Results showed that the surfaces coated with this version of the paint could almost match the surrounding air temperature at noon and achieve night temperature of 2.5° C below the ambient temperature.

The cool paint developed using both methods outperforms commercially available cool paints which typically are unable to bring surface temperatures below ambient.

Further investigations using a mix of unsorted plastic waste (mix of acrylic, PVC pipes and polystyrene foam) also showed that results were comparable to those from cool paints developed using only a single type of plastic waste. This suggests that the NTU team's approaches reduce the need for sorting different types of plastic.

Provided by Nanyang Technological University