

SOLAR WINDOW BLINDS WITH PASSIVE COOLING COATING AND SMART CONTROLLERS

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In the recent design of solar window blinds, the flexible solar films are attached to one side of the window blinds, making use of the building facades. As solar films absorb the heat from sunlight, a significant decrease in energy conversion efficiency becomes one obstacle for widespread commercial application. In order to tackle the difficulty, this project yields an improvement, where a passive cooling coating (PCC) is applied to another side of the window blinds. The PCC makes the temperature of window blinds lower than the ambient temperature effectively, by emitting the long-wave infrared to the outer environment. With the aid of PCC, the lower in-room temperature is attained, resulting in less energy required for air conditioners during summers. The solar window blinds involve two work states: (I) solar films are orientated towards the sunlight to harvest energy; (II) PCCs are orientated towards the sunlight to cool down the surrounding temperature. The switch of work states between (I) and (II) is achieved by smart controllers based on temperature data acquired from sensors. A prototype is fabricated to demonstrate how much energy conversion efficiency is promoted with PCCs.