

Controlling evaporation of thermo-sensitive polymers

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Three years ago, we experienced major black out in the summer. The accident was occurred because of excessive use of electric energy. After the accident, people tried to apply IR-cut film, solar cell or IR-reflective paint on the building surfaces to save the summer consumption of the electricity. For these reasons, we tried to evaporating structures for cooling materials. Thermo-sensitive polymer, Poly(N-isopropylacrylamide) (PNIPAM), which emitting their stored water when temperature was higher than low critical solution temperature (LCST), could effectively cool buildings compared to other materials. Into the responsive hydrogels, we applied coating layers controlling water evaporation. Our coating layer/PNIPAM structures showed suppressed evaporation at a low temperature. But at a high temperature, the evaporation rate was similar to non-covered PNIPAM hydrogels. Also, we confirmed a cooling effect of 20 degree °C temperature reduction at a 60 °C condition. This evaporative material could work for thermo-sensitive smart cooling. It can be applied as a paint material for any parts in a widerange of applications, which needs effective cooling.