

## **Hybrid reflective, catalytic and pyroelectric nanocomposite NRF funded project**

The urban heat island effect manifests in built-up populated areas has adversely increased the annual mean air temperature by a few degrees Celsius. One of the major factors that contribute to the urban heat island effect in Singapore is the geometric effect of tall and densely-packed buildings. These buildings unfavorably provide multiple surfaces for sunlight absorption and reflection. Other implication includes blocking of wind that leads to reduce convection cooling and air pollutants dissipation. Elevated ambient temperature can affect community's environment and quality of life namely 1) *Increased energy consumption*: Higher ambient temperature increases energy demand for cooling especially during peak periods. 2) *Increased air pollutant and greenhouse gases emission*: Increased energy demand consequently results in higher air pollutant and greenhouse gas emission. 3) *Compromised human well-being*: Warmer ambient along with higher air pollution levels can lead to general discomfort and other heat/pollution related sickness.

In view of the urban heat island effects, the granted National Research Foundation (NRF) proposal aims to develop hybrid nanocomposite for integrated cooling and waste heat-to-energy conversion technology. The nanocomposite consists of heat reflective nanostructures and polymer composites that capture and utilize reflected heat for electricity generation. Additionally, the nanocomposite also functions as photocatalytic material capable of degrading volatile organic compound pollutants for improved indoor air quality. The proposed technology offers multiple benefits, including improved human health and comfort, reduced energy usage, and lower greenhouse gas emissions.