MATERIALS TO FIGHT URBAN CLIMATE CHANGE.

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EXTENDED SUMMARY

Local climate change and in particular, the urban heat island, is the more documented phenomenon of climate change. It deals with the development of higher ambient temperatures in the dense areas of cities suffering from high anthropogenic heat release, compared to the temperature of the surrounding suburban or rural areas. Actually, there are available measurements for about 400 cities around the world. Heat island exists at any latitude and may be present during the day or night period, depending on the local thermal balance. The average magnitude of the phenomenon varies between 3 to 6 K, while much higher values are reported in many cities.

The urban heat island has a very serious impact on the energy consumption of building during the summer period while it increases the peak electricity demand spend by buildings. In parallel, it has a serious impact on the environmental quality of the indoor and outdoor spaces, increases the concentration of harmful pollutants like the tropospheric ozone and has a serious impact on human health.

To counterbalance the impact of local climate change and urban heat island, specific mitigation techniques have been developed and proposed. Mitigation techniques deal with the use of advanced materials that reflect the solar radiation and also emit highly infrared radiation, the use of additional green in open spaces like parks and street green and buildings like green roofs, the reduction of anthropogenic heat, the use of cool sinks that present a lower temperature than the atmosphere, etc.

Several types of mitigation materials have been developed and are available in the market. Products may be clustered in different generations, according to their maturity and suitability to mitigate the urban heat phenomenon. The first generation involves all natural materials, the second highly reflective white materials, the third infrared reflective colour materials, the fourth nanotechnological PCM doped reflective materials and finally the fifth generation involves smart chromic materials that are able to change colour as a function of the environmental conditions.