

## **Thermal Analysis and Spectral Radiative Properties of Insulation Color Coatings**

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Coating materials that can maintain the desired color in the visible range while reflecting near-infrared radiation from the sun are highly demanded for energy efficiency buildings or vehicle exterior coatings. Over a number of years, INCA has developed surface treatment technologies (e.g., solar off-loading technology) that provide the effect of insulation for building and industrial applications and outperform some of the most popular infrared reflective paints containing mainly titanium dioxide pigments. Field tests under solar irradiation or lamp irradiation suggest that the temperature rise can be reduced by 3-8°C compared with uncoated fabric of the same color. This is accomplished through color matching in the visible range, near-infrared reflecting, and high thermal emission in the long wave region. In this study, the spectral optical and radiative properties of coated and uncoated fabrics are measured using a monochromator (wavelengths from 400 to 1800 nm) and a Fourier-transform infrared spectrometer (wavelengths from 1.5 to 15  $\mu\text{m}$ ), coupled with white reflecting and gold reflecting integrating spheres, respectively. The results are to be used in a thermal analysis to interpret the outdoor thermal test results. This study will be important for the development and application of thermal management and energy saving coatings for exterior walls or fabric surfaces.