

Experiment and Analysis on Spectral Properties of Two Kinds of Thermal Radiation Coatings

Chuang Sun^S, Qing Ai and Xin-lin Xia^C

School of Energy Science and Engineering, Harbin Institute of Technology, Harbin, Heilongjiang, China
xiaxl@hit.edu.cn

Two thermal radiation coatings named Optical Solar Reflectors (OSR) have been measured and analyzed to understand the spectral properties and dependency on temperature. Because of spectral selectivity, the infrared emissivity used for evaluation of radiative heat exchange between this kind of coatings and surroundings, obviously depend on the operating temperature. Based on comparison method, an infrared emissivity experiments device is established, and the corresponding temperature range for the infrared emissivity is from 326 to 426 K. The experimental error for the new device is deduced and the results for the two kinds of sample are dominated. The infrared emissivity for the two sample have lesser difference, and they are both higher than 0.773 at 326 to 426 K. On the other hand, the infrared emissivity doesn't exist linear change along with temperature variation. Moreover, a completed experiment device is employed to obtain the spectral reflectance for the two coating. The typical measurement wavelength for the reflectance is 0.6328, 1.34 and 3.39 micrometer, and the direction hemisphere spectral reflectance is figured out. For the two coatings, the visible light wavelength reflectance is obvious higher than infrared wavelength. In order to analyze the experimental results, a theoretical model is established and the result for 0.6328 micrometer is simulated. Compared the numerical simulation result with the experimental one, the relative error is 4.49%.