

Suppression of solar radiation heating by coated silicic microspheres -Scattering of electromagnetic wave due to silicic spheres-

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It is well known that the insolation raises the room temperature in buildings and that the crisis of electric power supply is regularly caused by air conditioning in mid summer. Recently, some experiments demonstrated that the room temperature could be kept low when the external wall of buildings were coated with paint admixed with fine silicic spheres whose diameter is in micron scale. The consumption of energy, therefore, will be reduced if room temperature is controlled without any air conditioning and the heat island effects would be lowered. However, the mechanism of this temperature suppression has not been investigated. In this study, we aimed to find out the mechanism of the temperature suppression. We assumed that the electromagnetic waves which had a certain range of frequencies were scattered to shield the radiated heat energy in the insolation. For verifying the hypotheses and for finding the range of effective size, we used the Mie theory to calculate the intensity of scattered light by a set of packed spheres. As a result, we found that amplitude of scattered light depended on the wavelength of incident light and on the size of spheres. We concluded that these two parameters are the important clue for achieve our objectives.