A Study of the Percent Transmission and Electrical Resistance of Reflectin as a Function of Temperature

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In this experiment, changes in percent transmission resulting from changes in temperature were studied in reflectin. Reflectin, a protein found in the Hawaiian Bobtail Squid, has the ability to change color by altering the wavelength of light emitted. I collected the reflectin by centrifuging E. coli to extract it from the supernatant. It was shown that this wavelength can be altered by pH, electric current, and the presence of certain chemicals, but has never been examined in relation to a change in temperature. Peak transmission of reflectin approximately occurs at 26°C. In this experiment, a spin coat was used to embed reflectin in a glass slide, a light spectrometer used to determine percent transmission at 10 wavelengths, and an incubator used to heat the sample to 10°C, 30°C, 50°C, and 70°C; repeated with a light spectrometer. The percent transmission for all points were higher when the sample was at room temperature, at 26 and 30 degrees, while it was lowest at the extremes of the temperatures, at 10°, 50° and 70° C. The percent transmission varied by an average of 10%, from ~50% at room temperature to ~40% at the extremes of the data. Lines of best fit were very consistent and almost identical for the room temperature and 30°C sample, and for 10°, 50°, and 70° C. This indicates a strong relationship between temperature and percent transmission in reflectin. Possible applications: panels designed/placed on buildings coated in reflectin could have higher transmission at room temperature, lower transmission in cold temperatures, reduced amounts of light/heat could enter the building, thereby reducing the amount of energy needed to cool the building.

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