



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Sang Yoon Han	Project Number S0308
Project Title The Near Infrared Reflectivity of Different Types of Roofing Materials	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project was to find out the reflectivity of near infrared ray (NIR) of different types of roofing materials. The three roofing materials that were used in this experiment were wood shingles, galvanized iron shingles, and clay shingles. It is believed that the clay shingles would have the most reflectivity of NIR because based on the preliminary background research; the clay had the most conductivity of both heat and electricity.</p> <p>Methods/Materials Experimentally measuring the reflectivity of the roofing materials involved taking pictures of the roofing materials at the same time with numerous trials under same condition with digital single reflex camera (DSLR) with a NIR filter in front of a lens. Then each picture was cropped with the same dimension that contains three distinctive roofing materials. The reflectivity of these roofing materials was measured by the color saturation of each cropped image. The color saturation of each image will be measured using software.</p> <p>Results Each cropped images were measured by ppi or pixels per inch. The lower the value of ppi means that the image is low in density. The lower the number of density of an image is the result of lighter image which proves that it has the high reflectivity of near-infrared radiations which has been shown in the RGB histogram. The average ppi of clay shingle was 182 ppi whereas the ppi for galvanized iron shingle was 236.4 ppi with the highest ppi value and 215.5 ppi for wood shingle. Since the ppi value for the clay shingles were the lowest with 182 ppi, this implies that the clay shingle reflected the most amount of NIR.</p> <p>Conclusions/Discussion It was found that the clay shingles had the least density of color which means that it reflected the most amount of near-infrared radiations. This could be concluded because when the density of an IR image is low; an image appeared as light compare to an image of high density of color based on the background research. This means the lighter image reflected more infrared radiation compare to the darker image. Thus, it was concluded that the clay shingles reflected the most NIR rays and wood shingles absorbed the most rays.</p>	
Summary Statement My project was about finding the reflectivity of near infrared radiation of different types of roofing materials to see which material is most suitable for certain climate.	
Help Received Father helped gathering materials and setting up the project; My science teacher Mr. Antrim helped me to guide through the project and successfully finish it.	