Optical and Thermal Properties of Materials Applied in Concentrating Solar Power (CSP) Systems

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Concentrating solar power (CSP) systems use solar absorbers to convert sunlight to thermal electric power. In CSP systems electricity is generated from mirrors to focus sunlight onto a receiver that captures the solar energy and converts it into heat that can run a standard turbine generator or engine. The operational temperature ranges of materials for solar applications can be categorized as low temperature (T<T400ºC). Concentrating solar power (CSP) systems operate at high- and mid-temperatures. The operation of high efficiency CSP systems involves improvements in the performance of the coatings of the solar absorption materials. To accomplish this, new more efficient selective coatings are needed that have both high solar absorptance and low thermal emittance at the operation temperature. One of the best methods for measuring thermal transport properties are based on illumination of the material using a laser beam modulated with a CW signal (CW, Continuous Wave), this is done in order to excite a response in the material examined and through the application of appropriate mathematical and physical models; optical and thermal properties of materials are obtained. In this work photothermal radiometry (PTR) was used to determine optical and thermal properties of materials applied in CSP systems. PTR amplitude and phase lag data were obtained as function of the modulation frequency and temperature of the material under test.