Photothermal and Optical Characterization of Solar Collectors Based on Selective Solar Absorbers Surface

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The use of renewable energy sources has grown significantly due to next depletion of fossil energy sources, one of these renewable energy sources is solar energy, The production of hot water using solar water heater represents one of the most important applications of the solar energy [1] and is growing in importance due to the development of solar systems based on novel selective solar absorber surfaces. The efficiency of a solar collector depends on its ability to transform sunlight into heat, the coating of the solar collectors is fundamental to increase efficiency of the solar heater systems; new generation coatings have high absorption in the range of solar radiation and low emission in the infrared range, the characterization of these thermal and optical properties is critical in the design and application of high efficiency solar heater systems. In this work thermal and optical performance of a solar collector based on novel selective solar absorption coating obtained by electrochemical deposition method and a non selective solar absorption coating was studied. Infrared emissivity was evaluated with the aid of thermal wave resonant cavity (TWRC) technique [2, 3, 4]. Additionally optical absorbance, emittance and reflectance spectra of the coatings were obtained by traditional spectroscopy technique. The efficiency of the systems was also evaluated by measuring the incident solar radiation and the water temperature of the systems operating in natural convection. [5] The results show that the loss of infrared energy is lower in the selective solar absorption surfaces compared to surfaces that are non-selective solar absorption, so that the efficiency of solar heating increases significantly.