**Electrochemical Deposition of Solar Absorber Coatings for Thermal Solar Cells**

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The efficient conversion of solar radiation into thermal energy depends on the solar absorber used for the collector panel. These materials must absorb strongly in the solar spectrum range between 0.2-3μm, and emit poorly in the infrared region (higher than 3μm). High absorptance (α) and low emittance (ε) values must characterize them.

Among selective coatings absorbing solar energy, with high absorptance (α) and low emittance (ε) values, we can mention different black metals or oxides based on copper, nickel, aluminum, or cobalt, also cobalt-tin and nickel-tin metals-base materials have been reported (1-3). Most interest has been focused on nickel and chromium-based coatings due to their good optical properties and low cost. Unfortunately, the high toxic level of chromium and its operating difficulties (high currents are required for its deposition) made this material an undesirable choice for this application. Nickel-based selective coatings have been reported to present good properties and have been electrochemically deposited over different substrates.

In this work we report the electrochemical deposition of nanostructured nickel-based solar absorber coatings over stainless steel substrate. A sol-gel silica-based antireflection coating, from TEOS, is also applied to the solar surface by the dip-coating method. We studied different electrodeposition conditions and silica sol-gel coatings characteristics that affect the optical properties of the final solar absorber.
Different characterization techniques such as X-Ray diffraction analysis, UV-VIS-nIR-FTIR with integrated sphere, AFM, were employed for the analyses. Description of the relation between electrodeposition conditions with the solar absorber nanostructure obtained (Figure 2) is disscused. The coatings showed absorptance values between 0.91-0.96 and emittivity lower than 0.1 (Figure 1).

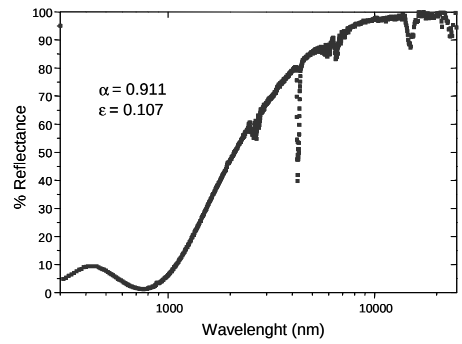


Fig. 1. Optical properties of a Ni-based solar absorber electrodeposited on stainless steel.

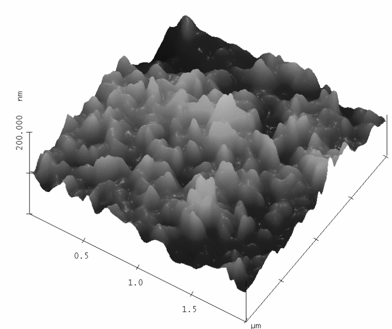


Fig. 2. An AFM image of a nanostructured Ni-based solar absorber.

References
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