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Electrochemical Characterization of Al<sub>2</sub>O<sub>3</sub>-Ni Thin Film Selective Surface on Aluminium

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
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**Abstract:** Solar thermal collectors represent a widely used type of system for the conversion of solar energy. In order to produce selective coatings on aluminium substrates to be used as absorber plates in high efficiency solar collectors, nickel pigmentation was applied to anodically oxidised surfaces. Electrochemical dc methods are used to study the oxidation of aluminium as functions of the following electrolysis conditions: applied current, pH, temperature and concentration of electrolyte. The properties of the oxidised aluminium surfaces are investigated by cyclic voltammetry. Nickel pigmentation of porous aluminium surfaces was also performed as a function of electrochemical pigmentation conditions by ac electrodeposition. Mechanisms contributing to selectivity in anodically oxidised aluminium and electrodeposits are discussed. The optical properties of the prepared surfaces are optimised, and solar absorptance  $\alpha_s=0.91$  and thermal emittance  $\epsilon_{t,23^\circ\text{C}}=0.17$  are obtained.

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