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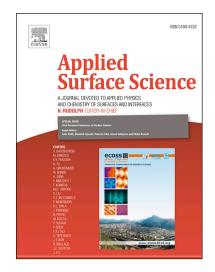
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CCEPTED MANUSCRIPT

Local electrical properties of thermally grown oxide films formed on

duplex stainless steel surfaces

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Abstract The local electrical properties of thermally grown oxide films formed on

ferrite and austenite surfaces of duplex stainless steel at different temperatures were

investigated by Current sensing atomic force microscopy, X-ray Photoelectron

Spectroscopy (XPS) and Auger Electron Spectroscopy (AES). The current maps and

XPS/AES analyses show that the oxide films covering austenite and ferrite surfaces

formed at different temperatures exhibit different local electrical characteristics,

thickness and composition. The dependence of electrical conductivity of oxide films

covering austenite and ferrite surface on the formation temperature is attributed to the

film thickness and semiconducting structures, which is intrinsically related to

thermodynamics and kinetics process of film grown at different temperature. This is

well elucidated by corresponding semiconductor band structures of oxide films

formed on austenite and ferrite phases at different temperature.

Keywords: Duplex stainless steel; Oxide film; Current sensing atomic force

microscopy; AES; XPS; Semiconductor

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1

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