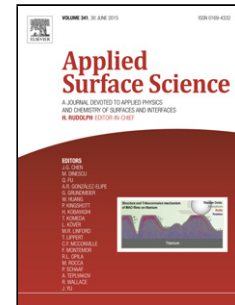


Accepted Manuscript

Title: The effect of surface pre-conditioning treatments on the local composition of Zr-based conversion coatings formed on aluminium alloys

Author: J. Cerezo I. Vandendael R. Posner J. H. W. de Wit
J.M.C. Mol H. Terry



PII: S0169-4332(16)00143-4
DOI: <http://dx.doi.org/doi:10.1016/j.apsusc.2016.01.106>
Reference: APSUSC 32338

To appear in: *APSUSC*

Received date: 6-8-2015
Revised date: 9-11-2015
Accepted date: 13-1-2016

Please cite this article as: J. Cerezo, I. Vandendael, R. Posner, J.H.W. Wit, J.M.C. Mol, H. Terry, The effect of surface pre-conditioning treatments on the local composition of Zr-based conversion coatings formed on aluminium alloys, *Applied Surface Science* (2016), <http://dx.doi.org/10.1016/j.apsusc.2016.01.106>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The effect of surface pre-conditioning treatments on the local composition of Zr-based conversion coatings formed on aluminium alloys

J. Cerezo^{a,b}, I. Vandendael^c, R Posner^d, J. H. W. de Wit^b, J. M. C. Mol^b,
H. Terryn^{a,b,c}

^aMaterials innovations institute (M2i), Mekelweg 2, 2628 CD, Delft, The Netherlands.

^bDelft University of Technology, Department of Materials Science and Engineering, Mekelweg 2, 2628 CD, Delft, The Netherlands.

^cVrije Universiteit Brussel, Research Group of Electrochemical and Surface Engineering, Pleinlaan 2, B-1050 Brussels, Belgium.

^dHenkel AG & Co. KGaA, Henkelstr. 67, 40589 Dusseldorf, Germany.

*J.M.C.Mol@tudelft.nl, Tel: +31 0 15 2786778; Fax: +31 0 2786730

- Field Emission Auger Electron Spectroscopy was used for local elemental analysis.
- Acid and alkaline pre-conditioning treatments induces Cu-enrichment on AA6014.
- A Cu-containing Zr-based conversion treatment for aluminium alloys was evaluated.
- Cu-rich areas enhance the local formation of Zr-based conversion films on AA6014.
- Thermal pre-conditioning treatments inhibits the formation of Zr-based coatings.

Abstract

This study investigates the effect of different alkaline, acidic and thermal pre-conditioning treatments applied to different Al alloy surfaces. The obtained results are compared to the characteristics of Zr-based conversion coatings that were subsequently generated on top of these substrates. Focus is laid on typical elemental distributions on the sample surfaces, in particular on the amount of precipitated functional additives such as Cu species that are present in the substrate matrix as well as in the conversion bath solutions. To this aim, Field Emission Auger Electron spectra, depth profiles and surface maps with superior local resolution were acquired and compared to scanning electron microscopy images of the sample. The results show how de-alloying processes, which occur at and around intermetallic particles in the Al matrix during typical industrial alkaline or acidic cleaning procedures, provide a significant source of crystallization cores for any following coating processes. This is in particular due for Cu-species, as the resulting local Cu structures on the surface strongly affect the film formation and compositions of state-of-the-art Zr-based films.

Download English Version:

<https://daneshyari.com/en/article/5353203>

Download Persian Version:

<https://daneshyari.com/article/5353203>

[Daneshyari.com](https://daneshyari.com)