EMCR 2015

11th International Symposium on Electrochemical Methods in Corrosion Research

PROGRAMME AND BOOK OF ABSTRACTS

May 24 – 29, 2015

Aqualuz Suite Hotel, Tróia – Portugal

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POSTER SESSIONS

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Tuesday, May 26 (afternoon)

A	
P-57-A	Optimization of SVET parameters for the investigation of benzotriazole as corrosion inhibitor on aluminium/copper galvanic coupling model *Coelho, L; Mouanga, M; Druart, M; Recloux, I; Olivier, M*
P-120-A	Determination of the susceptibility of martensitic stainless steel X46Cr13 to intergranular corrosion with potentiodynamic and potentiostatic methods *Schlipf, C; Rohwerder, M*
P-167-A	Improvement in the spatial resolution of local electrochemical impedance spectroscopy: what does that mean? *Vivier, V; Molena, C; Abreu, CP; Costa, I; De Melo, HG.; Keddam, M*
C	
P-23-C	Metallographic and electrochemical characterization of the porosity of a coating obtained by thermal spraying *Touazi, Y; Naimi, M; Mebdoua, Y*
P-45-C	Corrosion Protection of 304 Stainless Steel with Melting Gels Coatings *Aparicio, M; Jitanua, A; Rodriguez, G; Degnah, A; Al-Marzoki, K; Mosac, J; Klein, LC*
P-87-C	Adhesion and anticorrosion properties enhancement of thick hybrid sol-gel coatings for carbon steel protection *Jama, C; Phan, H; Bentiss, F*
P-91-C	*Influence of Yttrium and Lanthane base ceramic coatings on the corrosion behavior of aluminium alloys in saline solution* *Creus, J; Bekhiti D; Hamdadou, M*
P-99-C	Corrosion Resistance of Chrome Based nanostructured composition coatings for Oil Production *Yar-Mukhamedova, G; Ismailova, G; Koshimova, K; Shaikov, E; Sabirov, N; Mustaphayeva, M; Kemelzhanova, A*
P-101-C	Influence of nano-dispersion phase components - ratio on Cr-SiO2-C nano-CEC corrosion resistance *Yar-Mukhamedova, G; Yar-Mukhamedov, Y; Koshimova, K; Ismailova, G; Shaikov, E; Sabirov, N; Mustaphayeva, M; Kemelzhanova, A*
P-114-C	Electrochemical characterization of Poly(methyl methacrylate) for corrosion protection of AA2024-T3 *Sancy, M; Muñoz, L; Nguyen, A; Páez, M; Pébère, N; Ravagliati, F; Vejar, N*
P-170-C	Electrochemical and chemical characterization of electrodeposited zinc surface after passivation with a new surface treatment *Costa, I; Queiroz, F; Provazi, K; Ferreira Jr, J; Rossi, J; Baker, M; Tomachuk, C*
P-171-C	Investigation on the effect of a chromium free sealing treatment for the corrosion resistance of AA2198-T851 after Tartaric Sulphuric Anodising (TSA) *Costa, I; Kurusua, V; Terada, M; Hammela,N; Queiroz, FM; Rossi, JL; Capelossi, VR*

D	
P-19-D	Evaluation of Corrosion Resistance of UNS S32304 Lean Duplex Stainless Steel Plates Welded by SMAW, GMAW and FCAW in Acidified Glycerin *Sicupira, D; Frankel, G; Lins, V*
P-51-D	Monitoring the degradation and the corrosion of naphthenic acids by electrospray ionization Fourier transform ion cyclotron resonance mass spectrometry and atomic force microscopy. *Dixini, P; Pereira, T; Vanini, G; Celante, V; Castro, E; Vaz, B; Fleming, F; Gomes, A; Aquije, G; Romão, W*
P-177-D	Inhibition Effect Assessment of Green Tea (Camellia Sinensis) Extracts on the Corrosion Behavior of Mild Steel in Dilute Chloride Acid Solutions by DC Electrochemical Methods *Cavalcanti, HS; Silva, AB; Soares, FS; de Paula, RCV*
E	
P-84-E	On the corrosion behavior of reinforced cement with granite-processing residues additions *Freire, L; Díaz, B; Nóvoa, R; Calo, C; González, C*
P-113-E	Electrochemical Behavior of Reinforced Concrete Using Waste Industry as Mineral Admixture *Hernandez, N; Olguin, F; Lopez, L; Volpi, V; Baltazar, M*
P-174-E	Copper sulfate acidic dissolution emulating mining situation: leaching of concrete and corrosion of structural steel. *Carvajal, A; Gómez, M; Maturana, P; Solas, A*
I	
P-30-I	Recent developments in triboelectrochemistry: on the use of electrochemical impedance spectroscopy and its modelling *Vivier, V; Keddam,M; Liao, F; Ponthiaux, P*
P-69-I	Electrochemical Impedance Spectroscopy Study of AA7075 aluminium alloy in NaCl solution: influence of nitrogen implantation. *Abreu, C; Figueroa, R; Cristóbal, M; Nóvoa, X; Pena, G*
P-175-I	Microstructure effect on electrochemical behavior of the Ti6Al4V alloy in Hank's solution *Chávez-Díaz, M; Arce-Estrada, E; Cabrera-Sierra, R*

Thursday, May 28 (afternoon)

B	
P-11-B	Electrochemical investigations on pitting corrosion inhibition of mild steel by provitamin B5 in circulating cooling water *Deyab, M*
P-75-B	Corrosion inhibition of steel by polyphenol model molecules: rutin, esculin, esculetol *Veys-Renaux, D; Reguer, S; Rocca, E; Mirambet, F*
P-129-B	Treatment and characterization of Layered Double Hydroxide (LDH) as nanocontainers of molybdate for corrosion inhibition *Aoki, I; Bendinelli, E; Margarit-Mattos, I*
P-132-B	Electrochemical and X-ray photoelectron spectroscopy studies of 2,5-bis(n-aminophenyl)-1,3,4-oxadiazoles as efficient corrosion inhibitors for carbon steel surface in hydrochloric acid solution *Bentiss, F; Tourabi, M; Nohair, K; Traisnel, M; Jama, C*
P-145-B	Corrosion inhibition of steel in acidic medium by orange peel extract and its major compounds *Veys-Renaux, D; M'hiri, N; Rocca, E; Ioannou, I; Mihoubi Boudhrioua, N; Ghoul, M*
P-152-B	Inhibition performance assessment to bark extract of corrosion as garlic inhibitor 1020 carbon steel corrosion in the replacement benzotriazole *Rosa Capelossi, V; Souza Barreto, L; Correa Guedes, I; Dani Rico Amado, F*
F	
P-118-F	Effects of eutectic modifier and high-pressure torsion processing on microstructure and corrosion resistance of hypoeutectic Al-7Si alloy *Nie, M; Wang, X; Wang, C; Wang, S; Gao, N*
G	
P-150-G	Corrosion protection of PVD and Paint Coatings for Selective Solar Absorber Surfaces *Fernandes, JCS; Nunes, A; Carvalho, M; Diamantino, T*
H	
P-27-H	Multiscale electrochemical analysis of the corrosion of titanium based implant alloys *Ezquerdo, J; Vasconcelos, H; Souto, R; Bolat, G; Moreci, D*
P-68-H	Influence of different sodium fluoride pretreatments of an experimental magnesium alloy on the electrochemical corrosion behavior and surface roughness *Schille, C; Schweizer, E; Geis-Gerstorfer, J*
P-109-H	Protection and functionalization of AISI 316L for orthopedic implants *Cere, S; Omar, S; Ballarre, J*
P-110-H	Anodic oxides with nanotubular structure in pure zirconium for biomedical applications *Cere, S; Milosev, I; Gomez Sanchez, A*
P-138-H	Tribological behavior of passive layers generated on CoCr alloy *Garcia-Alonso, M; Diaz, I; Montoya, R; Escudero, M*
P-139-H	Debris in wear-corrosion of CoCr alloy and cellular response *Escudero, M; Diaz, I; Kavanaugh, A; Billi, F; Perez-Maceda, B; Lozano, R; Garcia-Alonso, M*

J	
P-49-J	Stress corrosion cracking of α,β' brass under constant anodic polarization in NaNO3 solution *Berne, C; Blanc, C; Andrieu, E; Reby, J; Sobrino, J*
P-82-J	Influence of oxide layer on the early stage of cathodic protection *Jeannin, M; Sabot, R; Zanibellato, A; Novoa, R*
P-89-J	Cathodic Behaviour of Nickel in Alcohol Solutions of Electrolytes *Bisztyga, M; Lelek-Borkowska, U; Bana, J*
P-169-J	Inhibiting corrosion and hydrogen absorption by steel in salt-water media containing biogenic H2S with the use of organic compounds possessing biocide activity *Zelentsova, V; Beloglazov, G; Beloglazov, S; Bulychev, A*
K	
P-161-K	Modelling of Corrosion Inhibitors by Holographic Interferometry and EIS *Habib, K; Al-Arbeed, A*
M	
P-21-M	Potentiostatic experiments made more efficiently *Linhardt, P; Kührer, S; Ball, G; Biezma, M*
P-47-M	The application of Electrochemical Frequency Modulation (EFM) technique to study the corrosion inhibitor efficiency for mild steel *Morozov, Y; Montemor, MF*
P-54-M	On normalization of 'in-field' DL-EPR measurements to standard temperature requirement *Shutko, KI*

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SESSION G

Corrosion in Energy Conversion and Storage

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Corrosion Protection of PVD and Paint Coatings for Selective Solar Absorber Surfaces

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The selective solar absorber surface is a fundamental part of a solar thermal collector, as it is responsible for the solar radiation absorption and for reduction of radiation heat losses. The surface's optical properties, the solar absorption (α) and the emittance (ε), have great impact on the solar thermal collector efficiency. In this work, two coatings types were studied: coatings obtained by physical vapor deposition (PVDs) and coatings obtained by projection with different paints (PCs) on aluminum substrates. The most common industrial high performing solar selective absorbers are nowadays produced by vacuum deposition methods, showing some disadvantages, such as lower durability, lower resistance to corrosion, adhesion and scratch, higher cost and complex production techniques. Currently, spectrally selective paints are a potential alternative for absorbing surfaces in low temperature applications, with attractive features such as ease of processing, durability and commercial availability with low cost. Solar absorber surfaces were submitted to accelerated ageing tests, specified in ISO 22975-3. This standard is applicable to the evaluation of the long term behavior and service life of selective solar absorbers for solar collectors working under typical domestic hot water system conditions. The studied coatings have, in the case of PVDs solar absorptions between 0.93 and 0.96 and emittance between 0.07 and 0.10, and in the case of PCs, solar absorptions between 0.91 and 0.93 and emittance between 0.40 and 0.60.

In addition to evaluating long term behavior based on artificial ageing tests, it is also important to know the degradation mechanism of different coatings that are currently in the market. Electrochemical impedance spectroscopy (EIS) allows for the assessment of mechanistic information concerning the degradation processes, providing quantitative data as output, which can easily relate to the kinetic parameters of the system. EIS measures were carried out on Gamry FAS2 Femostat coupled with a PCL4 Controller. Two electrolytes were used, 0.5 M NaCl and 0.5 M Na_2SO_4, and the surfaces were tested at different immersion times up to 4 weeks. The following types of specimens have been tested: Aluminium with/without surface treatment, 3 selective paint coatings (one with a poly(urethane) binder and two with silicone binders) and 2 PVD coatings. Based on the behaviour of the specimens throughout the 4 weeks of immersion, it is possible to conclude that the coating showing the best protective properties corresponds to the selective paint coating with a polyurethane resin followed by the other paint coatings, whereas both the PVD coatings do not confer any protection to the substrate, having a deleterious effect as compared to the untreated aluminium reference.

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Keywords: Selective Solar Absorber, PVD, Selective Solar Paints, EIS