

4th International Meeting for Researchers in Materials and Plasma Technology 2017

Journal of Physics: Conference Series Volume 935

Santa Marta, Colombia
23 - 26 May 2017

Editor:

Ely Dannier V. Nino

ISBN: 978-1-5108-5516-8
ISSN: 1742-6588

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by the Institute of Physics
All rights reserved. The material featured in this book is subject to
IOP copyright protection, unless otherwise indicated.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Table of contents

Volume 935

4th International Meeting for Researchers in Materials and Plasma Technology (4th IMRMPT)

23–26 May 2017, Santa Marta, Colombia

Accepted papers received: 11 December 2017

Published online: 29 December 2017

Preface

[4th International Meeting for Researchers in Materials and Plasma Technology \(4th IMRMPT\)](#)

[Peer review statement](#)

Papers

[A theoretical calculation of the electronic and magnetic behaviour of C-doped zincblende AlN](#)

Miguel J Espitia R, J F Murillo G and C Ortega López.....1

[Structural properties of \$\text{La}_{3.5-x}\text{Ba}_{4.5+x-y}\text{Ca}_y\text{Cu}_8\text{O}_{18}\$ system \(\$0.2 < x < 0.4\$ and \$0.3 < y < 0.5\$ \)](#)

L A Pérez Díaz, A F Cruz Pacheco, J A Gómez Cuaspud, C A Parra Vargas and C A Ortiz Otalora.....5

[Blast furnace dust and phosphorous slag, new materials for use in road engineering](#)

R Ochoa Díaz.....9

[Hydrothermal synthesis of a photovoltaic material based on \$\text{CuIn}_{0.5}\text{Ga}_{0.5}\text{Se}_2\$](#)

Y T Castellanos Báez, D A Fuquen Peña, J A Gómez-Cuaspué, E Vera-López and Y Pineda-Triana.....13

[Structural and magnetic analysis of the \$\text{Pr}_{1.5}\text{Eu}_{1.5}\text{Ba}_5\text{Cu}_8\text{O}_{18}\$ system](#)

J A Parra-Borda, F G Rojas-Cruz, A F Cruz-Pacheco, S Segura-Peña and C A Parra Vargas.....17

[Use of steel slag as a new material for roads](#)

R Ochoa Díaz, M Romero Farfán, J Cardenas and J Forero.....23

[Structural and magnetic analysis of the \$\text{Bi}_{x-1}\text{Sm}_{0x}\text{FeO}_3\$ \(\$x=0.04\$ and \$0.07\$ \) system](#)

J D Suárez Londoño, S Segura Peña, E H Sáchica, A F Cruz Pacheco, A Sarmiento Santos and C A Parra Vargas.....27

[Characterization and obtainment of phosphate rock concentrates of Turmequé, Boyacá](#)

S Quijano Zanguña, L F Lozano Gómez and Y Pineda Triana.....32

[Analysis of synthetic profile of CZTS as photovoltaic material obtained with variations of titanium and TiN](#)

M Muñoz, E Vera, J Gómez and Y Pineda.....37

[Preparation of concrete mixtures with electric arc furnace slag and recycled ground glass](#)

Y Pérez Rojas, E Vera López, M López Rodríguez and J Díaz Pita.....42

[Dyes removal from water using low cost absorbents](#)

S Giraldo, A P Ramirez, M Ulloa, E Flórez and N Y Acelas.....47

[Production and characterization of activated carbon from wood wastes](#)

A P Ramirez, S Giraldo, M Ulloa, E Flórez and N Y Acelas.....53

[Synthesis by combustion in solution of \$Zn_2TiO_4+Ag\$ for photocatalytic and photodynamic applications in the visible](#)

A A Lopera, A M Velásquez, E A Chavarriaga, S Ocampo, M A Zaghete, M A Graminha and C P Garcia.....59

[Influence of MWCNT/surfactant dispersions on the mechanical properties of Portland cement pastes](#)

B Rodríguez, J H Quintero, Y P Arias, O A Mendoza-Reales, J C Ochoa-Botero and R D Toledo-Filho.....64

[Structural and mechanical study of concrete made from cementitious materials of low environmental impact](#)

A K González, A M Montaña, C P González and A Santos.....69

[Inclusion of geopolymers derivate from fly ash and pumice in reinforced concrete](#)

A M Montaña, C P González, D Castro, G Gualdron and R Atencio.....74

[Evaluation of the electrical conductivity and corrosion resistance for layers deposited via sputtering on stainless steel](#)

J Blanco, Y Salas, C Jiménez, Y Pineda and A Bustamante.....79

[Evaluation of tribological wear and corrosion in coatings of diamalloy 4060NS deposited by thermal spray](#)

S M Acuña R, C M Moreno T and E J Espinosa C.....87

[Sputtering of the 1020 AISI steel in abnormal glow discharge](#)

J A García Zúñiga, A Sarmiento Santos and B Álvarez Luna.....94

[Effect of surface roughness on nitriding processes by dielectric barrier discharges of carbon steel](#)

Y P Quiñonez-Delgado, H J Dulce-Moreno, G Peña-Rodríguez and L G Arriaga-Hurtado.....99

[Wear and corrosion behaviour of Al₂O₃-TiO₂ coatings produced by flame thermal projection](#)

M Forero-Duran, H J Dulce-Moreno, M Ferrer-Pacheco and F Vargas-Galvis.....103

[Projection parameters for zirconia-alumina-ceria coatings made by flame spraying from results of numerical simulation](#)

L Rodríguez, M Ferrer, F Vargas and G Peña.....108

[Optimization of the parameters for obtaining zirconia-alumina coatings, made by flame spraying from results of numerical simulation](#)

M Ferrer, F Vargas and G Peña.....114

[Wear evaluation of flank in burins of high speed steel modified with titanium ions](#)

J E Caballero and E D V-Niño.....120

[Scanning electron microscopy of heat treated TiO₂ nanotubes arrays obtained by anodic oxidation](#)

D I Naranjo, S J García-Vergara and S Blanco.....125

[Electric dipole moment of magnetoexciton in concentric quantum rings](#)

L F García, I D Mikhailov and S Yu Revinova.....130

[Effect of pH and chloroauric acid concentration on the geometry of gold nanoparticles obtained by photochemical synthesis](#)

G R Conde Rodríguez, G H Gauthier, L O Ladeira, J A Sanabria Cala and D Laverde Cataño.....136

[Detailed study of the magnetic behaviour at low scale in \$\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3\$](#)

I C Arango, J E Ordoñez, C Dominguez, C Arango and M E Gomez.....141

[Interfacial coupling in multiferroic \$\text{BiFeO}_3\$ and ferromagnetic \$\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3\$ thin films](#)

C Dominguez, J E Ordoñez and M E Gomez.....146

[In vitro electrochemical behaviour of Chitosan-PEG coatings obtained on Ti6Al4V by dip coating](#)

A Sandoval Amador, S M Guerrero-Barajas, D R Hernandez-Salas, D K Sierra-Herrera, H A Estupiñan-Duran and D Y Peña Ballesteros.....151

[Formation of Ca/P ceramic coatings by Plasma Electrolytic Oxidation \(PEO\) on Ti6Al4V ELI alloy](#)

Y Rodriguez-Jaimes, D I Naranjo, S Blanco and S J García-Vergara.....156

[The effect of pulsed current electrodeposition parameters of calcium phosphates coating on Ti6Al4V ELI](#)

D K Sierra-Herrera, A Sandoval-Amador, N D Montañez-Supelano and D Y Peña-Ballesteros.....161

[Corrosion of Ti6Al4V ELI surfaces texturized by \$\text{CO}_2\$ laser in SBF](#)

A Sandoval-Amador, J J Daza Rodriguez, N D Montañez Supelano, J A Sanabria Cala and D Y Peña-Ballesteros.....166

[HOS cell adhesion on Ti6Al4V ELI texturized by CO₂ laser](#)

A Sandoval-Amador, Y M Bayona-Alvarez, H Carreño Garcia, P Escobar-Rivero and D Y Peña-Ballesteros.....172

[Mechanical properties of ceramic structures based on Triply Periodic Minimal Surface \(TPMS\) processed by 3D printing](#)

S Restrepo, S Ocampo, J A Ramírez, C Paucar and C García.....176

[A novel biphasic calcium phosphate derived from fish otoliths](#)

N D Montañez-Supelano, A Sandoval-Amador, H A Estupiñan-Durán and D Y Peña-Ballesteros.....182

[Study of a magnetorheological fluid submitted to a uniform magnetic field](#)

H A Fonseca, E Gonzalez and J Restrepo.....188

[Electrical and structural behaviour of the perovskite LaCr_{0.4}Co_{0.4}Fe_{0.2}O₃](#)

W Rativa-Parada, J A Gómez-Cuaspud, E Vera-López and J B Carda-Castelló.....193

[Characterization of fly ash, slag and glass hull for the obtaining of vitreous materials](#)

D M Ayala Valderrama and J A Gómez Cuaspud.....198

[Characterization of films formed by the aluminizing of T91 steel](#)

J A Sanabria Cala, G R Conde Rodríguez, D Y Peña Ballesteros, D Laverde Cataño and L S Quintero Rangel.....205

[Determination of the coefficient of dynamic friction between coatings of alumina and metallic materials](#)

A Santos, E Córdoba, Z Ramírez, C Sierra and Y Ortega.....210

[Analysis of the stormwater drainage of the historic walls of Cartagena de Indias between the bastions of San Lucas, Santa Catalina and Santa Clara](#)

A Utria, M Saba and E Quiñones-Bolaños.....216

[Formation and decomposition of siderite for CO₂ treatment](#)

E Y Mora, A Sarmiento, E Vera, V Drozd, A Durigyn and S Saxena.....221

[Compositional, thermal and microstructural characterization of the Nopal \(*opuntia ficus indica*\), for addition in commercial cement mixtures](#)

C G Hernández Carrillo, J A Gómez-Cuaspué and C E Martínez Suarez.....226

[Effects of CaO on the compaction and sintering by plasma of Powder-metallurgical iron](#)

H G Ariza Suarez, A Sarmiento Santos and C A Ortiz Otálora.....232

[Mn-modification effects on Nb₂O₅ structural, optical and vibrational properties](#)

A M Raba, E Murillo and M R Joya.....237

[Azimuthal polarization states for the optimization of a liquid crystal display Sony LCX038ARA in the pure-phase regime](#)

C J Salamanca Vela, Y Torres Moreno, J Barrero Perez and C Acevedo Caceres.....242

[Characterization using XRD of puzzolanic materials from residual sludge from water treatment](#)

G Barón, A M Montaña and C P González.....246

[High-temperature behaviour of ammonium dihydrogen phosphate](#)

A Pardo, J Romero and E Ortiz.....251

[Evaluation of corrosion products formed by sulfidation as inhibitors of the naphthenic corrosion of AISI-316 steel](#)

J A Sanabria-Cala, N D Montañez, D Laverde Cataño, D Y Peña Ballesteros and C A Mejía.....256

[The effect of zinc thickness on corrosion film breakdown of Colombian galvanized steel](#)

A Sandoval-Amador, J E Torres Ramirez, P A Cabrales-Villamizar, D Laverde Cataño and D Y Peña-Ballesteros.....262

[Effect of the temperature and the CO₂ concentration on the behaviour of the citric acid as a scale inhibitor of CaCO₃](#)

K Blanco, H Aponte and E Vera.....267

[Electrochemical techniques implementation for corrosion rate measurement in function of humidity level in grounding systems \(copper and stainless steel\) in soil samples from Tunja \(Colombia\)](#)

Y Salas, L Guerrero, J Blanco, C Jimenez, S P Vera-Monroy and A Mejía-Camacho.....272

[Electrochemical characterization of corrosion in materials of grounding systems, simulating conditions of synthetic soils with characteristics of local soils](#)

Y Salas, L Guerrero, S P Vera-Monroy, J Blanco and C Jimenez.....278

[Effects of oxidation-nitridation in the presence of water vapor on ASTM A335 P92 steel using SEM-EDS and XPS characterization techniques](#)

J C Orozco, V Kafarov, D Y Peña and A Alviz.....284

[Study of the continuous corrosion in an oxidation environment derived from the theoretical combustion products in a refinery. Case study: Ferritic steel ASTM A335 P91](#)

A Alviz Meza, V Kafarov and D Y Peña Ballesteros.....291

[Correlation between the thermal performance and the microstructure of the material used in medium and high voltage transformer terminals](#)

Y J Salas, S P Vera-Monroy, A Mejia-Camacho and W Rivera.....298

[Assessing of the effect of hydrodynamics in the growth of scale \(CaCO₃\) in rotating cylinder electrode](#)

M García, E J Espinosa Cardenal and E Vera.....302

[Evaluation of corrosion inhibitor simulating conditions of operation](#)

O Gómez, H Aponte, E Vera and Y Pineda.....306

[Comparison of two temperature control techniques in a forced water heater solar system](#)

E Hernández, R E Guzmán, A Santos and E Cordoba.....311

[Comparative study of the energy potential of cyanide waters using two osmotic membrane modules under dead-end flow](#)

Y García-Díaz, E Quiñones-Bolaños, C Bustos-Blanco, L Vives-Pérez, C Bustillo-Lecompte and M Saba.....315

[Design of a residential microgrid in Lagos del Cacique, Bucaramanga, Colombia](#)

D Bellon, O A González Estrada and A Martínez.....320

[Construction, study and mathematical modelling of the electrical behavior of CZTiS photovoltaic material as function of time and synthesis temperature](#)

M Patarroyo, H Pérez, J Gómez and E Vera.....324

[Hydrothermal synthesis and characterization of the semiconductor material Cu₂ZnTiS₄](#)

H G Pérez Bustos, M Patarroyo-Mesa, J A Gómez-Cuaspud, Y Pineda-Triana and E Vera-López.....330

[Chemical obtaining of \$\text{LiMO}_2\$ and \$\text{LiM}_2\text{O}_4\$ \(M=Co, Mn\) oxides, for cathodic applications in Li-ion batteries](#)

A Y Neira-Guio, J A Gómez Cuaspad, E Vera López and Y Pineda Triana.....336

[Effect of the voltage pulse frequency on the structure of \$\text{TiO}_2\$ coatings grown by plasma electrolytic oxidation](#)

D A Torres-Cerón, F Gordillo-Delgado and S N Moya-Betancourt.....342

[Transport spin dependent in nanostructures: Current and geometry effect of quantum dots in presence of spin-orbit interaction](#)

H Paredes-Gutiérrez, S T Pérez-Merchancano and C L Beltran-Rios.....348

[2D and 3D virtual interactive laboratories of physics on Unity platform](#)

J D González, J H Escobar, H Sánchez, J De la Hoz and J R Beltrán.....354

[Anisotropy included in a nanoscale superconductor: Theoretical development](#)

O J Gaona, J D González and J R Beltrán.....361

[ForistomApp a Web application for scientific and technological information management of Forsitom foundation](#)

L A Saavedra-Duarte, A Angarita-Jerardino, P A Ruiz, H J Dulce-Moreno, F H Vera-Rivera and E D V-Niño.....365

[Comparison of different approaches of modelling in a masonry building](#)

M Saba and D Meloni.....371

[Simulation of the electromagnetic field in a cylindrical cavity of an ECR ions source](#)

A Estupiñán, E A Orozco, V D Dugar-Zhabon and M T Murillo Acevedo.....376

[Adsorption of arsenate on Fe-\(hydr\)oxide](#)

N Y Acelas and E Flórez.....382

[Effect of conduction band nonparabolicity on Aharonov-Bohm oscillations in n-type InAs/GaAs quantum ring](#)

L F García, I D Mikhailov and H Paredes.....387

[Electrons acceleration in a \$TE_{113}\$ cylindrical cavity affected by a static inhomogeneous magnetic field](#)

V E Vergara, J D González, J R Beltrán and E A Orozco.....393