

MATERIALS SCIENCE ENGINEERING



EUROPEAN CONGRESS AND EXHIBITION ON
ADVANCED MATERIALS AND PROCESSES

SEPTEMBER 26TH - 28TH, 2018
DARMSTADT, GERMANY

CONGRESS PROGRAM MSE 2018

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ORGANIZING SOCIETY

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GERMAN
MATERIALS
SOCIETY



Guest Country
Argentina

ENDORSED BY



	B05: Biomaterials Applications	C05: Small Scale and In Situ Mechanical Testing	C07: Orientation Image Microscopy: The Evolution. EBSD, TKD, PED-TEM, ECCI + correlation with APT	C09: Mechanical Processing and Deformation Induced Microstructural Evolution, Damage Mechanisms and Failure Characterization from Micro to Macro Imaging	F01: High-Temperature Functional Materials	F04: Functional Materials for Energy Applications	M03: Microstructure Evolution in Applied Materials: Process to Property	M05: Plasticity Across the Scales – From Microstructure Changes to Bulk Mechanical Behavior
	Room: S1/01 - A01	Room: S1/01 - A03	Room: S1/01 - A04	Room: S1/01 - A02	Room: S1/03 - 123	Room: S1/03 - 223	Room: S1/01 - A2	Room: S1/01 - A4
Session	B05.3: Session 3	C05.3: Fatigue		C09.3: Session 3	F01.3: Metallic High-Temperature Materials	F04.3: Session 3	M03.3: Polymers and Miscellaneous	M05.3: Session 3
Session Chair(s)	V. Mourino	M. Sebastiani		J. Freudenberger	J. Hartmann	M. Acosta M. Hinterstein	D. Schneider	M. Stricker
16:30	Mechanically- and chemically-active nanostructured antibacterial surfaces fabricated by glancing angle sputter deposition <i>N. Ziegler</i>	An experimental and microstructural investigation of biaxial Bauschinger effects in IF steel DC06 using in-situ neutron diffraction <i>M. Härtel</i>		Advancing materials by SPD-mediated lattice defect engineering <i>M. Zehetbauer</i>	High temperature corrosion in waste-to-energy plants due to chlorine release through sulfation reaction of alkali chlorides <i>S. Pentz</i>	Is ReO ₃ a mixed ionic-electronic conductor? A DFT study of defect formation and migration in a B(V)O ₃ perovskite-type oxide <i>J. Parras</i>	Keynote Lecture Shape memory effect in polymers containing small molecules <i>F. Varnik</i>	Keynote Lecture A direct look at how dislocations move <i>A. Stukowski</i>
16:45	Additive manufacturing of titanium-hydroxylapatite hybrid constructs for regeneration of cranial bone defects <i>V. Bednarzig</i>	The role of room temperature grain coarsening on initiation of fatigue damage in thin metal films <i>O. Glushko</i>		Mechanical properties and deformation mechanisms in alloys Hastelloy X and Haynes 214 for honeycomb liners <i>S. Ulan Kyzyl</i>	Microstructure evolution in Ni-containing Co-Re-Cr alloys and its effect on alloy properties <i>K. Esleben</i>	Determining defect concentrations from voltage and partial pressure dependent chemical capacitance measurements <i>A. Schmid</i>		
17:00	Synthesis of polymeric hydrogel coatings with an atmospheric pressure plasma jet for biomedical applications <i>M. Levien</i>	Highlight Lecture Effect of sample size and grain boundaries on the dislocation structures and damage evolution: A micro-fatigue investigation <i>J. Velayarce</i>		Creep deformation mechanisms in SX Co-base superalloys: Compositional changes at planar faults studied by means of TEM and APT <i>M. Lenz</i>	Finite Element Simulation of the elastic anisotropic material behaviour of coarse-grained nickel base superalloys <i>B. Engel</i>	Characterization and investigation of Fe:STO thin films prepared by pulsed laser deposition <i>M. Morgenbesser</i>	Numerical investigation of the pore evolution in polycrystalline fibers <i>J. Kundin</i>	Atomistic simulations of the deformation behavior of thin film structures <i>A. Prakash</i>
17:15	Localized corrosion and cytotoxic effect of ASTM F745 in culture medium <i>R. Gregorutti</i>	Degradation of superelastic NiTi during uniaxial and multiaxial cyclic loading <i>H. Van Swynghevoen</i>		Microstructure Evolution of Niobium Rich Advanced Titanium Aluminide Alloy During Hot Compression <i>B. Singh</i>	Thermomechanical Induced Precipitation of Intermetallic Phase Particles in Ferritic Stainless Steels <i>J. Pöpperlová</i>	Oxygen isotope exchange on ceria: CO ₂ splitting in the temperature range between 300 and 900 °C <i>D. Uxa</i>	Thermal energy storage in cement pastes containing microencapsulated phase change materials: a microstructural model analysis <i>A. Caggiano</i>	Atomic-Level Processes of Shear Band Nucleation in Metallic Glasses <i>D. Soppu</i>
17:30	A new method for obtaining magnetic Bioactive glass 45S5@3D scaffolds modified with nanoparticles of iron-loaded hydroxapatite, characterization, and evaluation of its biocompatibility in different types of cells. <i>M. Dittler</i>	Small scale fatigue crack growth and fracture: a case study in the nickelbase superalloy CMSX-4 <i>P. Grünwald</i>		SFB-TR-103: Interdisciplinary Scale Bridging Material Science of Co- and Ni-based Single Crystal Superalloys <i>G. Eggeler</i>	Oxidation behaviour of roughing mill work rolls and effect on thermomechanical fatigue <i>K. Bläser</i>	Keynote Lecture Ionic conductivity of acceptor doped sodium bismuth titanate (NBT): Influence of dopants, phase transitions and defect associates <i>S. Steiner</i>	Self-organization of nanostructured morphologies in physical vapor deposited immiscible alloys <i>R. Raghavan</i>	Atomistic and mesoscale simulations of nanoindentation and nanoscratching of metals – A statistical approach to characterize discrete dislocation microstructures <i>N. Gunkelmann</i>
17:45	Novel strategy for immunoprotective islet macroencapsulation <i>K. Skrzypek</i>	Dynamic Micro Testing Overcoming 5 Decades of Strain Rates <i>F. Huberth</i>		Oral Poster The Impact of Residual Stress on the Crack Growth Behavior in Martensitic Steels <i>A. Wildeis</i>			The Generation of Random Surfaces by Means of Additive Manufacturing with respect to Offset-Is-sues <i>K. Noack</i>	Investigation of size effects on the plastic zone properties at crack tip <i>R. Gatti</i>
17:48								Oral Poster Microstructure of Fe-Nd-B processed by selective laser melting <i>U. Pflanz</i>
17:51								Oral Poster Porous Structures Developed from Novel thermoplastic-ceramic Systems Via Fused Deposition <i>M. Camerucci</i>
17:54								Oral Poster Additive production of 3D-structured, highly filled nanoparticle-reinforced composite materials <i>L. Windisch</i>
18:00	MSE Poster Session S1101 - karo 5							

	P01: Manipulation of Matter by Electric and Magnetic Fields	P02: Additive Manufacturing Technologies and Materials	P04: Nanocomposites and Nanolaminated Functional Coatings	P05: Advances in Atomic Layer Deposition Technologies: Conformal Thin Films and Hybrid Materials for Energy, Electronics and Health	P07: Joining	S05: Bulk Ultrafine- and Nano-Structured Materials	S06: Compositionally Complex Alloys – High Entropy Alloys	S07: Mechanical Behavior of Advanced Structural Materials
	Room: S1/03 - 283	Room: S1/03 - 221	Room: S1/03 - 23	Room: S1/03 - 226	Room: S1/03 - 23	Room: S1/01 - A3	Room: S1/01 - A5	Room: S1/01 - A1
Session	P01.3: Session 3	P02.3: Processes		P05.3: Hybrid and Molecular Layer Deposition	P07.1: Session 1	S05.3: Thermal Effects and Magnetic Properties	S06.3: Microstructure	S07.3: Properties of SPD Materials and Nanocomposites
Session Chair(s)	R. Kirchheim	F. Lasagni		Y. Gönüllü	M. Säglitz	E. Bruder	B. Hallstedt	W. Skrotzki
	Highlight Lecture Reaction controlled field assisted sintering of ceramic nanocomposites <i>A. Ragulya</i>	Printing Photopolymers by Hot Lithography <i>B. Steyrer</i>		Keynote Lecture Hybrid Materials by Vapor Phase Infiltration of Ceramics into Polymers <i>M. Knez</i>	Development of a high temperature resistant reactive filler alloy for brazing of SiC <i>M. Graffé</i>	Formation of w phase in Ti-Fe alloys and its stability upon heating <i>M. Kriegerl</i>	Microstructural properties of Al-containing refractory high entropy alloys for high temperature applications <i>H. Chen</i>	Keynote Lecture Incremental Feedings with High-Pressure Torsion (IF-HPT) and High-Pressure Sliding (IF-HPS) for Upsizing Sample Dimensions <i>Z. Horita</i>
	Pattern Formation during Current Sintering - Experiments <i>C. Gorynski</i>	Additive manufacturing of Low Temperature Co-fired Ceramic by DLP technology <i>E. Xuriguera</i>			Study of a diffusion couple of pure Fe/Ti <i>A. Besnard</i>	Magnetic Binary Supersaturated Solid Solutions processed by Severe Plastic Deformation <i>M. Stückler</i>	Effect of macroalloying on microstructure and high temperature oxidation resistance of new refractory compositionally complex alloys <i>F. Müller</i>	
	Pattern formation during current sintering – Simulation <i>L. Engelke</i>	Additive manufacturing of soft magnetic materials and components <i>D. Schuller</i>		Atomic/molecular layer deposition of azobenzene-containing hybrid thin films with reversible photoresponsive behaviour <i>A. Khayyami</i>	Resistance Spot Welding of Aluminum-Steel Joints Using Modern Medium-Frequency Inverter Technique (MFDC) <i>M. Säglitz</i>	Highlight Lecture Influence of annealing on microstructure and mechanical properties of ultrafine-grained Ti45Nb <i>A. Hohenwarter</i>	Introducing a chip based µ-bulk setup for microscopic heat treatment studies of compositionally complex single crystal superalloys <i>D. Kubacka</i>	Mechanical and Structural behavior of Cu/Fe Nanocomposites produced by Accumulative Roll Bonding <i>M. Ghanem</i>
	Field Assisted Sintering of Rare Earth Doped Ceria (REDC) <i>T. Mishra</i>	Experimental analysis of laser post-processing of additive manufactured metallic parts <i>J. dos Santos Solheid</i>		Search for Novel Inorganic-Organic Carboxylate Network Thin Film Structures by Atomic/Molecular Layer Deposition <i>J. Penttinen</i>	Joining aluminium with copper for applications in electro mobility <i>J. Kaspar</i>	Investigation of Phase Transformation and Grain Growth in Nanocrystalline Austenitic Stainless Steels Produced by High Energy Mechanical Alloying <i>H. Kotan</i>	Trace elements influencing the lattice parameters in the Al10Co25Cr8Fe15Ni36Ti6 compositionally complex alloy <i>A. Manzoni</i>	Highlight Lecture Understanding plasticity of pearlitic nanolamellar structures through a simple material model <i>J. Alkorta</i>
	Grain growth in electric field: Influence of Defects, Space Charge and Atmosphere <i>W. Rheinheimer</i>	In Situ and Real-Time Quality Monitoring of AM/Laser Process <i>T. Le Quang</i>		Simultaneous enhancement of toughness and elimination of the UV sensitivity of Kevlar with a combined ALD/MPI process <i>I. Azpitarte</i>	Tailoring the thickness of intermetallic interfacial nanolayers by temperature control of FSW in Al-Cu lap joints <i>R. Marstatt</i>	Recrystallisation in K-doped and pure cold rolled tungsten (W) sheets: As-rolled condition and isochronal annealings (1 h) <i>P. Lied</i>	Phase stability and solid solution strengthening in fcc high-entropy alloys investigated by a diffusion couple approach <i>T. Keil</i>	Highlight Lecture Interaction of Hydrogen with SPD-induced Lattice Defects: Features and Properties <i>M. Zehetbauer</i>
	Improving efficiency and temperature distribution during field assisted sintering by advanced thermal insulation <i>M. Bram</i>	Oral Poster Shaping, debinding and sintering as a low cost additive manufacturing method of solid metal <i>Y. Thompson</i>			Nano-soldering pseudo-composite material to decrease engine bearing failure <i>P. Olaru</i>	Structural analysis and magnetic properties of Fe-Co-Ag and Fe-Co-Cu alloys processed by severe plastic deformation <i>A. Bachmaier</i>	Priority Programme (SPP2006) Compositionally Complex Alloys - High Entropy Alloys (CCA - HEA) <i>U. Glatzel</i>	Grain structure and mechanical properties of the commercially pure copper and Cu-Al hybrid materials processed by the High Pressure Torsion Extrusion <i>D. Nugmanov</i>
		Oral Poster Microstructure of Fe-Nd-B processed by selective laser melting <i>U. Pflanz</i>						
		Oral Poster Porous Structures Developed from Novel thermoplastic-ceramic Systems Via Fused Deposition <i>M. Camerucci</i>						
		Oral Poster Additive production of 3D-structured, highly filled nanoparticle-reinforced composite materials <i>L. Windisch</i>						
18:00	MSE Poster Session S1101 - karo 5							

Friday, 28th September 2018

Session Chair:

B04.3: Biomateriomics

F. Nudelman

14:45	<p>Highlight Lecture Tracking the Early Events of Mineral Formation during Coral Development T. Mass (Sp)¹; A. Akiva²; M. Neder¹; K. Kahil³; R. Gavriel⁴; I. Pinkas³; G. Goobes⁴ ¹University of Haifa (Israel); ²Eindhoven University of Technology (Netherlands); ³Weizmann Institute of Science, Rehovot (Israel); ⁴Bar Ilan University, Ramat Gan (Israel)</p>
15:00	<p>Highlight Lecture Three-Dimensional Architecture and Surface Functionality of Coccolith Base Plates F. Nudelman (Sp)¹ ¹University of Edinburgh (United Kingdom)</p>
15:15	<p>Highlight Lecture Osteoderms – A new nano-micro hierarchical biomineralized structure in vertebrates S. Bertazzo (Sp)¹; A. Kirby¹; F. Iacoviello¹; P. Shearing¹; A. Olivo¹; S. Evans¹; M. Moazen¹ ¹University College London (United Kingdom)</p>
15:30	<p>Hidden substructures in sea shells as inspiration for modern materials C. Böhm (Sp)¹; J. Harris¹; S.E. Wolf¹ ¹Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) (Germany)</p>
15:45	<p>Highlight Lecture Crystallographic gradients transform biominerals into functionally graded and toughened ceramics S. Wolf (Sp)¹; J. Harris¹; D. Wallis²; P. Zavattieri³; B. Merle¹; F. Marin⁴ ¹Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) (Germany); ²Utrecht University (Netherlands); ³Purdue University, West Lafayette (United States); ⁴Université de Bourgogne Franche-Comté, Dijon (France)</p>
16:00	<p>Sea urchin spines: A brittle material without size effect on structural strength? C. Lauer (Sp)¹; S. Mück¹; G. Buck¹; K. Klang¹; C. Berthold¹; K.G. Nickel¹ ¹University of Tübingen (Germany)</p>
16:15	<p>Highlight Lecture Materials inspired from fossils and their relatives D. Kisailus (Sp)¹ ¹University of California, Riverside (United States)</p>

B05: Biomaterials Applications



Room: S1/01 - A01

This symposium will attract experts working in the broad field of biomedical applications of materials, including metals, ceramics, polymers and their composites. Presentations will include topics ranging from biomedical implants, coatings and surface treatment of biomaterials to novel biomaterial approaches for tissue engineering, regenerative medicine and drug delivery. Thus biomedical applications of both permanent and biodegradable materials will be considered in this symposium. Moreover advanced methods for the characterization and testing of biomaterials in in-vivo relevant conditions will be also considered, with emphasis in the tissue/biomaterial interface. Other topics will include innovative multifunctional bioactive coatings for biomedical devices, as well as tailored surface functionalization approaches for eliciting specific biological responses. Biomaterial based approaches to develop advanced scaffolds for tissue regeneration will be also covered in this symposium. New concepts directed at the development of multifunctional scaffolds (next generation scaffolds) will be presented, which can have a drug delivery or biomolecular signalling function thus providing enhanced support to cell attachment, growth and proliferation.

Symposium Organizers

- Aldo R. Boccaccini - Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Department of Materials Science and Engineering, Germany
- Viviana Mourino - University of Buenos Aires, Pharmaceutical Technology, Argentina
- Jonny Blaker - University of Manchester, School of Materials, United Kingdom
- Enrica Verne - Polytechnic of Turin, Department of Applied Science and Technology, Italy
- Klaus D. Jandt - Friedrich Schiller University Jena, Chair of Materials Science, Germany

Wednesday, 26th September 2018

Session Chair:

B05.1: Bioactive, Antibacterial Surfaces and Coatings

A. R. Boccaccini

10:45	<p>Smart Reinvention of Drug Delivery Systems with Graphene I. Firkowska-Boden (Sp)¹; M. Arras²; K.D. Jandt¹; F. Dong³ ¹Friedrich Schiller University Jena (Germany); ²Oak Ridge National Laboratory (United States); ³Guizhou University, Guiyang (China)</p>
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11:00	<p>In vitro methods for the evaluation of antimicrobial surface designs J. Sjollema (Sp)¹; B.A. Zaat²; V. Fontaine³; M. Ramstedt⁴; K. Thevissen⁵; R. Luginbuehl⁶; J. Li⁷; H.C. van der Mei⁸; H.J. Busscher⁸ ¹University of Groningen (Netherlands); ²University of Amsterdam / Academic Medical Center (Netherlands); ³Université Libre de Bruxelles (Belgium); ⁴Umeå University (Sweden); ⁵KU Leuven (Belgium); ⁶RMS Foundation, Bettlach (Switzerland); ⁷Beijing Jiaotong University (China); ⁸University Medical Center Groningen (Netherlands)</p>
11:15	<p>Development and characterization of bioactive and antibacterial surfaces for bone contact applications M. Cazzola (Sp)¹; S. Yamaguchi²; S. Ferraris¹; M. Miola¹; A. Cochis³; L. Rimondini³; S. Spriano¹; E. Vernè¹ ¹Politecnico di Torino (Italy); ²Chubu University, Kasugai (Japan); ³Università del Piemonte Orientale, Novara (Italy)</p>
11:30	<p>Synergic antibacterial coatings combining titanium nanocolumns and tellurium nanorods J. Garcia-Martin (Sp)¹; M. Fernandez-Castro²; M.U. González²; T. Webster³; W. Tien-Street³; D. Medina³; I. Fernandez⁴ ¹Instituto de Micro y Nanotecnología, Tres Cantos (Spain); ²Spanish National Research Council (CSIC), Tres Cantos (Spain); ³Northeastern University, Boston (United States); ⁴Nano4energy, Madrid (Spain)</p>
11:45	<p>Keynote Lecture Controlling Protein Adsorption through Nanostructured Polymeric Surfaces I. Firkowska-Boden (Sp)¹; X. Zhang¹; C. Helbing¹; K.D. Jandt¹ ¹Friedrich Schiller University Jena (Germany)</p>

Wednesday, 26th September 2018

Session Chair:

B05.2: Scaffolds and Nanomaterials for Tissue Engineering

J. Blaker

14:30	<p>Anti-microbial alginate gels with improved stability as a cell scaffold and wound dressing material P. van Rijn (Sp)¹ ¹University of Groningen (Netherlands)</p>
14:45	<p>New Ways in Nanomedicine Based on Biocompatible Porous Silicon Nanostructures V. Sivakov (Sp)¹; L. Osminkina² ¹Leibniz Institute of Photonic Technology, Jena (Germany); ²Moscow State University (Russia)</p>
15:00	<p>Initial study on 3D printing of piezoelectric barium titanate ceramics for bone tissue engineering C. Polley (Sp)¹; T. Distler²; D. Rüffer¹; R. Detsch²; A. R. Boccaccini²; H. Seitz¹ ¹University of Rostock (Germany); ²Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) (Germany)</p>
15:15	<p>Drug-loaded polymer-based matrices manufactured by electrohydrodynamic processes G. Abraham (Sp)¹; G. Rivero¹ ¹Universidad Nacional de Mar del Plata UNMdP (Argentina)</p>
15:30	<p>The ESA effect as possible quantification method in nanoparticle modification A. Renner (Sp)¹; M. Schütz¹; D. Moog¹; T. Fischer¹; S. Mathur¹ ¹University of Cologne (Germany)</p>
15:45	<p>Novel Multifunctional Nanocomposite Scaffolds as Matrices for Drug Delivery and Bone Tissue Engineering A. R. Boccaccini (Sp)¹; J.P. Cattalini²; R. Vidotto²; V. Mourino² ¹Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) (Germany); ²University of Buenos Aires (Argentina)</p>

Wednesday, 26th September 2018

Session Chair:

B05.3: Session 3

V. Mourino

16:30	<p>Mechanically- and chemically-active nanostructured antibacterial surfaces fabricated by glancing angle sputter deposition N. Ziegler (Sp)¹; C. Sengstock²; V. Mai³; K. Tschulik¹; M. Köller²; A. Ludwig¹ ¹Ruhr-Universität Bochum (Germany); ²University Hospital Bergmannsheil, Bochum (Germany); ³Mathys Ltd Bettlach (Switzerland)</p>
16:45	<p>Additive manufacturing of titanium-hydrogel-hydroxyapatite hybrid constructs for regeneration of cranial bone defects V. Bednarzig (Sp)¹; A. R. Boccaccini¹; R. Detsch¹ ¹Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) (Germany)</p>
17:00	<p>Synthesis of polymeric hydrogel coatings with an atmospheric pressure plasma jet for biomedical applications M. Levien (Sp)¹; I. Amin¹; K.-D. Weltmann¹; K. Fricke¹ ¹Leibniz Institute for Plasma Science and Technology INP, Greifswald (Germany)</p>
17:15	<p>Localized corrosion and cytotoxic effect of ASTM F745 in culture medium R. Gregorutti (Sp)¹; J. Grau¹; D. Castrogiovanni¹; J. Parisi¹; C. Elsner² ¹CICPBA, La Plata (Argentina); ²CONICET (Argentina)</p>
17:30	<p>A new method for obtaining magnetic Bioactive glass 45S5® 3D scaffolds modified with nanoparticles of iron-loaded hydroxyapatite, characterization, and evaluation of its biocompatibility in different types of cells M. Dittler (Sp)¹; G. Frank²; I. Unalan²; A. Grünwald²; M. Gonzalez¹; A. R. Boccaccini² ¹Universidad Nacional de la Plata (Argentina); ²Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) (Germany)</p>
17:45	<p>Novel strategy for immunoprotective islet macroencapsulation K. Skrzypek (Sp)¹; D. Stamatialis¹ ¹University of Twente, Enschede (Netherlands)</p>

LOCALIZED CORROSION AND CYTOTOXIC EFFECT OF ASTM F745 IN CULTURE MEDIUM

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Abstract

Austenitic stainless steels (specification ASTM F138/139/745) are widely used for load bearing partial and total joint replacements, and post trauma reconstructive surgeries. These biomaterials contain Cr and Ni, which would cause different systemic-toxic reactions during the time that the device is implanted in the body. In particular, Ni is known as an allergenic agent and has some carcinogenic potential.

To evaluate this behaviour, samples of ASTM 745 have been subjected to localized corrosion assays by cyclic polarization tests, using a cell culture medium (CCM) as an electrolyte. The CCM allows simulating in a more approximate way the conditions of the human body. In the present work, DMEM high glucose containing inorganic salts, vitamins, proteins, and supplemented with 10% inactivated fetal calf serum, 100 IU/mL penicillin and 100 µg/mL streptomycin sulfate, was used as CCM. The aim was to release Cr and Ni ions to evaluate their possible cytotoxic effects.

Cytotoxicity was evaluated by Neutral red and MTT assays, using UMR-106 cell line. The bioassays were performed by triplicate and eight measurements were done in each case. The mean values from the 24 determinations were compared to negative and positive controls. The negative control is the culture medium not exposed to any toxic agent, while the positive control consists of the culture medium with a toxic agent (0.01% phenol) that causes a decrease in cell viability. The data were statistically analyzed by Student's t-test, considering a critical p-value < 0.05. For $p \geq 0.05$, the null hypothesis is valid and for $p < 0.05$, the null hypothesis is refused.

The obtained electrochemical results are shown in Figure 1. The fast current increase observed at potentials close to 0.800 V/Ref could be ascribed to the onset of localized corrosion. After that, the stainless steel showed high repassivation capacity, since the reverse scan ended at 0.600 V/Ref, with a short hysteresis loop.

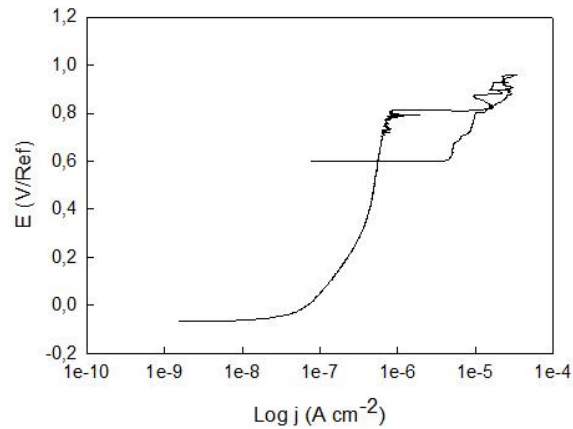


Figure 1. Polarization curve of ASTM F745 in CCM.

The results of the bioassays are shown in Figure 2.

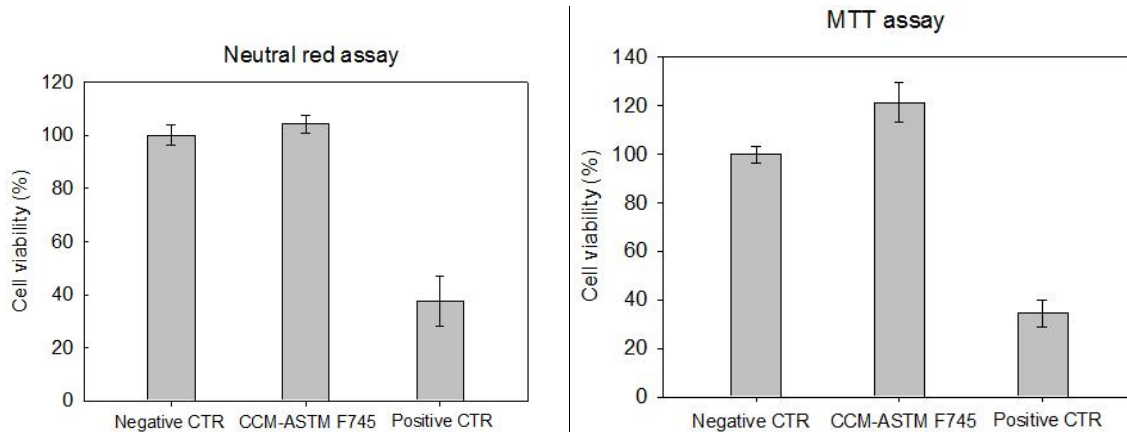


Figure 2. Cell viability in CCM exposed to ASTM F745 localized corrosion

Neutral Red assay, which evaluates lost in cell viability when a determined element or compound affects the integrity of the plasmatic membrane, did not show significant differences between the CCM and the negative control. The MTT assay assesses the mitochondrial metabolic activity. Although the behaviour was different with respect to the negative control, the cell viability was higher than 100%, with critical p-value < 0.01.

The comparison with the positive control indicated that the cell viability was considerably greater in both assays, the critical p-value being lower than 0.001.

According to these results, under the specified tests conditions of the present work, the CCM tested did not cause cytotoxic effects in UMR-106 cell line. The reason for this behavior could be related to the fact that the Cr and Ni released during the localized corrosion did not reach concentration levels detrimental to cell viability.