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Este boletín informativo electrónico de periodicidad bimestral tiene como objetivo informar de las actividades de investigación desarrolladas en la ETS de Ingeniería y Diseño Industrial y recopilar los resúmenes de los artículos publicados en la Web of Science (WoS) de los que son autores o coautores investigadores de la Escuela.

PUBLICACIONES.

Optical Partial Discharge Diagnosis in SF6 Gas-Insulated System With SiPM-Based Sensor Array.

This paper aims to promote optical partial discharge (PD) detection from laboratory scale to practical application for sulfur hexafluoride (SF6)insulated power equipment. First, a micro silicon photomultiplier (SiPM)based PD sensor is evaluated for detecting PDs in SF6 gas and is proven to have the equivalent properties with pulse current acquisition and vacuum photomultiplier tube in terms of the signal-to-noise ratio, pulse resolution, and linearity. Then, a double-spectral PD sensor based on SiPM is first proposed and developed to realize a more specific PD diagnosis. It is demonstrated that by using the double-spectral PD sensor not only stochastic PD patterns can be obtained for PD recognition, but PD severity can be estimated as well.



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Modeling the anodization of large titanium electrodes.

Potentiostatic anodization of large size titanium electrodes (> 200 cm(2)) has been modeled and validated. During the process, with the development and growth of the TiO2 nanotubes (TiO2-NTs) layer there is a variation in the resistance of the system. A time-dependent model for this parameter is implemented looking for fitting the experimental data of current density with the simulation results. Finally, and more importantly, the model allows obtaining the distribution of oxidized titanium mass in the

surface of the electrode. Although in this case the geometry of the anodized titanium plate is quite simple, the same procedure can be applied for the anodization of more complicated electrodes. Consequently, it is possible to evaluate whether the distribution of TiO2 structures with the electrochemical anodization procedure is adequate or not without carrying out the expensive and time-consuming experimental research stage. (C) 2018 Elsevier Ltd. All rights reserved.



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Mechanical properties and abrasive wear of white/brown coir epoxy composites.

A substitution of synthetic fillers by natural fillers decreases an environmental burden, namely both in terms of saving fossil sources, and of a minimization of energy demands on a preparation of a reinforcement for composite systems. Last but not least the natural fibres are available and so they decrease a price of a final product. Performed experiment describes strength characteristics of white and brown coir fibres and biocomposites with the synthetic matrix and these fibres prepared by a vacuum infusion. Water solution of NaOH (6%, 12 h) was used for treating of the fibre surface. The strength characteristics of the fibres differ depending on time of their harvesting - the tensile strength of previously harvested white fibres reached 115 MPa, the tensile strength of brown coir fibres harvested in a full maturity of the coconuts reached 123 MPa. The chemical treatment of the

fibres led to roughening of the surface and to an improvement of an interfacial interaction. The chemical treatment of the fibres also led to the increase of their tensile strength up of 58 MPa (brown fibres) and the modulus was increased of 1.87 GPa on average. Globular formations on the surface of the fibres were removed due to the alkali acting. Layers of lignin were reduced which led to an improvement of the interaction with used epoxy resin. The inclusion of chemically treated brown fibres increased the matrix strength of 28.64 MPa, the inclusion of white fibres of 20.22 MPa.



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Characterization of the chemical structure of vinyl ester resin in a climate chamber under different conditions of degradation.

Due to the good strength and similar toughness of epoxy resins, vinyl ester resins are widely used as thermoset adhesives in structural adhesive joints and as composites for different industrial applications. However, vinyl ester adhesives are difficult to cure completely under environmental conditions, even after long periods of time because of gel formation slows the necessary diffusion of the catalyst across the polymer network.

Several studies have used weathering chambers to investigate the degradation mechanisms of vinyl ester adhesives. However, a review of the scientific literature revealed both a wide variety of aging processes and several ambiguities between the recorded experimental results.

In this work, post-cured vinyl ester resins at different aging cycles were aged under high temperature and relative humidity, and the changes in their structure, mechanical and adhesion properties were studied. Chemical and structural changes were observed in the vinyl ester resins after aging in a climatic chamber. (C) 2018 Elsevier Ltd. All rights reserved.



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A geometric description of the extreme Khovanov cohomology.

We prove that the potential extreme Khovanov cohomology of a link is the cohomology of the independence simplicial complex of its Lando graph. We also provide a family of knots having as many non-trivial extreme Khovanov cohomology modules as desired, that is, examples of H-thick knots that are as far from being H-thin as desired.

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Influence of anodization mode on the morphology and photocatalytic activity of TiO2-NTs array large size electrodes.

Properties of nanotubular titania structures (TiO2-NTs) have been widely evaluated in small electrodes at lab scale. A novel experimental approach to overcome the limitations for the anodization of large size electrodes is presented. Several potentiostatic and galvanostatic anodization procedures have been tested, and their impact on the morphological features of the TiO2-NTs analyzed. A clear relationship between the applied voltage and current density and the NTs length and diameter is confirmed. Photocatalytic activity of the TiO2-NTs structures was evaluated in the methanol oxidation reaction. From these results, it was obtained that kinetic constant for the photocatalytic oxidation of methanol is higher when the reaction is carried out with NTs of higher length/diameter aspect ratio. This is related to a higher TiO2 active surface area available to generate photo-induced electron-hole pairs and for the adsorption of the reactants. This work confirms the viability of formation of photocatalytically active large size TiO2-NTs electrodes when high voltage or current density is applied under controlled conditions. Availability of fluoride in the electrolyte can be ensured by the use of a novel concept of continuous flow anodization reactor allowing the renovation of the electrolyte to keep under control not only the composition but also the temperature of the solution.



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Analysis of the feasibility of the use of CDW as a low-environmental-impact aggregate in conglomerates.

This article summarises the first phase of a research project that analyses the feasibility of re-using plastic cable waste (pellets) as a means of reducing the environmental impact of buildings. The aim is to find a use for this plastic waste in construction materials, specifically gypsum matrices, by characterising the physical and chemical properties of the raw material and the physical and mechanical properties of the compounds. The results obtained show that the addition of up to 70% of the weight of the gypsum in aggregate improved some of the properties tested, such as surface hardness and capillary absorption, and significantly reduced the use of gypsum and water. (C) 2018 Elsevier Ltd. All rights reserved.



Under Terrico Superior de Lenero y Diseño Industrial

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Influence of the fabrication route of tunsgen-2 wt.% vanadium in the microstructure and mechanical properties.

This study evaluates the microstructural and mechanical behaviour of two tungsten (W) - 2 wt.% vanadium (V) alloys and compares them with a pure W reference material. All the materials were processed by hot isostatic pressing (HIP). However, some differences were introduced during the fabrication process of the W-2 V alloys: one was processed with mechanical alloying (MA) and the other with only mixing of the powders. For the mechanical characterisation non-standard tree-point bending (TPB) tests were performed in air in both smooth and V-notched specimens. Tests were performed in a temperature range between 77 K, via immersion in liquid nitrogen, to 1073 K to determine the mechanical strength, yield strength and fracture toughness. Other physical and mechanical tests were performed such as measurement of the hardness, density and elastic modulus. The results exhibit significant differences between both alloys and the pure-W reference material and reveal the critical important of the MA during the fabrication process.



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