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Abstracts Collection

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Preface

In ECORFAN® we are attached to the RENIECYT-CONAHCYT / 1702902 and integrated in the National System of Researchers - SNI - at Levels I-II and III in the areas of Physical Mathematics and Earth Sciences - Biology and Chemistry - Medicine and Health Sciences - Humanities and Behavioral Sciences - Social Sciences - Biotechnology and Agricultural and Livestock Sciences and Engineering, We are aware that in order to build the Scientific Digital Identity of Authors in Mexico, we must increase the optimal allocation of scientific, technological and innovation production to meet the needs of the country. Establish the instances and mechanisms of coordination with the governments of the federal entities, as well as the linkage and participation of the scientific and academic community of the institutions of higher education, of the public, social and private sectors for the generation and formulation of policies for the promotion, dissemination, development and application of science in the priority areas of Mexico. To promote the development, linkage and dissemination of scientific research derived from basic and applied research activities, quality technological development and innovation, associated with the updating and improvement of education and the expansion of the frontiers of knowledge supported by new information technologies, according to the order of priority and international scientific indexing, which is why we present the results of our 18th International Conference - doing science, technology and innovation in the world.

CDMX.
September 25, 2024

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Physical and Mathematical Sciences and Earth Sciences

Optical fiber encoder based on phase shifting interferometry

Encoder de fibra óptica basado en interferometría de cambio de fase

LÓPEZ-ÁLVAREZ, Yadira Fabiola, PEÑA-LECONA, Francisco Gerardo, MUÑOZ-MACIEL, Jesús and RODRÍGUEZ-FRANCO, Martín Eduardo

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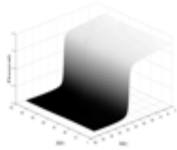
Abstract

In an automated industrial system monitoring and controlling the position of moving objects represents a crucial element in processes that have rotating systems.This is regularly in robots that use internal sensors to monitor the position of their joints. In this work we present the study of an optical encoder based on a Mach Zehnder interferometer. To determine the phase, the Phase Shift Interferometry algorithm was use, using five steps. The optical fiber encoder used the rotation matrix, and the results were correlated with those obtained by the optical technique, the reported behavior shows a wide similarity between the optical encoder and the simulated. The experimental design showed a differential distance of 0.0452 rad between the initial and that obtained after deformation. We report an encoder capable of recovering the initial phase, showing a difference in the correlation of 0.0000925 u.a.

Optical fiber encoder based on phase shifting interferometry.

Objective	**Methods**	**Results**
Demonstrate the interferometric encoder capability. Check the sensor behavior demonstrated by simulation.	Optical technique: Phase shifting interferometry. Use of optical fiber interferometer as transducer. **Experimental design** Mach-Zehnder interferometer 	The encoder is highly robust, capable of recovering its initial phase, with a differential distance of 0.0452 rad. 

Optical encoder, optical fiber, Mach Zehnder interferometer

Social Sciences

The relationship that exists between market analysis and sales management carried out by microentrepreneurs in Santa Cruz de Juventino Rosas, Gto.

La relación que existe entre análisis de mercado y la gestión de ventas que llevan a cabo los microempresarios de Santa Cruz de Juventino Rosas, Gto.

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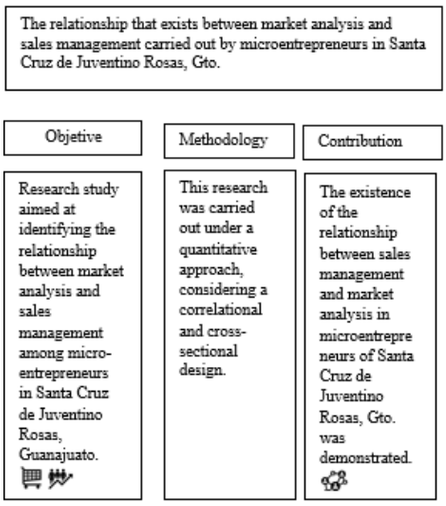
Abstract

This article is the result of a research study aimed at identifying the relationship between market analysis and sales management among micro-entrepreneurs in Santa Cruz de Juventino Rosas, Guanajuato. This was done through a statistical correlation, using Pearson's correlation coefficient with data from a sample of 593 micro and small enterprises, applying the quantitative research method, transversal exploratory, in which the relationship between market analysis and sales management of the micro-entrepreneurs was analyzed. The following hypotheses were defined: H0: there is no relationship between market analysis and sales management of the micro-entrepreneurs in Santa Cruz de Juventino Rosas, Gto., and H1: there is a relationship between market analysis and sales management of the micro-entrepreneurs in Santa Cruz de Juventino Rosas, Gto. With a Spearman's Rho of 0.314 and a significantly small p-value, the correlation between both variables was confirmed, validating hypothesis H1. It is concluded, therefore, that there is indeed a relationship between market analysis and sales management



Market Analysis, Micro Entrepreneurs, Sales Management

Pearson's correlation as a method of checking the Financial Beta

El coeficiente de correlación Pearson como método de comprobación de la Beta Financiera

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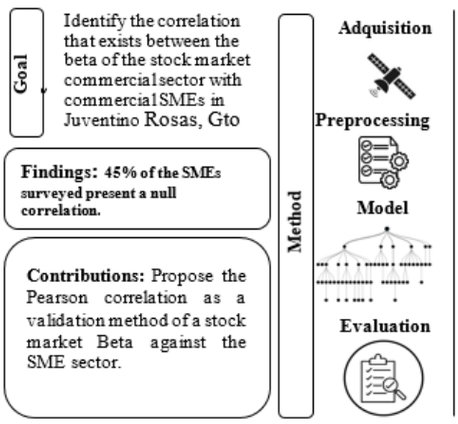
Abstract

The objective of this article is to use the Pearson correlation coefficient as a methodology to verify the beta that an SME must use in a certain sector in order to carry out its financial analysis, but with the peculiarity that SMEs are not listed on the stock market and it will be more difficult to manage their financial analyzes according to the type and sector they belong to, for this purpose a quantitative analysis will be made based on their annual sales, applying a quantitative methodology with the help of a tool known as Pearson's correlation, which will serve as a tool for the comparison in order to verify the beta according to the business of the SME and its competitors in the same sector.



Beta, Risk, PyME

Elements of Organizational Culture and their implementation in Generation Z. Literature Analysis

Elementos de la Cultura Organizacional y su implementación en la Generación Z. Análisis de Literatura

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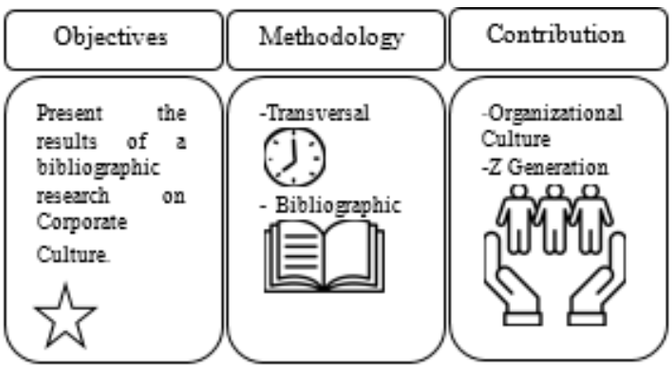
Abstract

An element of organizational development is organizational culture. This concept has been the subject of study for decades. The objective of this work is to present a theoretical foundation of the concept and contextualize it with its components, as well as to relate it to the workplace relevance of Generation Z. The relevance of Organizational Culture and its benefits are demonstrated, using Denison's Model as an example. The analysis explores its core aspects and the implications it has within organizations. A study is conducted on the importance of Identity within the company. The characteristics of Generation Z are considered, highlighting their significance and the way they shape their life perspectives, in comparison to Millennials. Finally, the analyzed concepts are connected, and a proposal is presented for a quantitative research study that could be developed based on this work.



Organizational Culture, Micro Businesses, Generation Z, Diagnosis

Engineering

Automatic medicine dispenser using medical prescriptions

Expendedor automático de medicamentos a partir de recetas médicas

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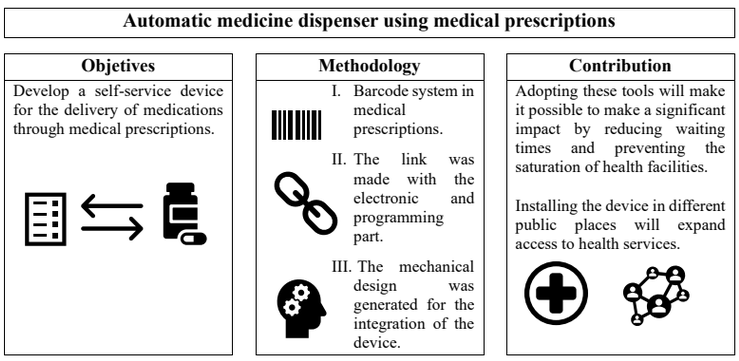
Abstract

In this paper, the objectives, the methodology used for the execution of the project and the results achieved is presented. The project constitutes the development of a self-service device that allows the delivery of medication prescribed by a specialist by reading an identifier on medical prescriptions. For development it was necessary different stages, the development of the barcode system in medical prescriptions was the first stage, considering that this system was carried out in a previous paper, subsequently the link was made with the electronic and programming part, that is, communication was established with the graphical user interface and subsequently the mechanical design for the integration of the device was generated. Adopting these tools will make it possible to achieve an important impact by reducing waiting times and preventing saturation of facilities in non-eventual situations, by contemplating their installation in different public places, expanding access for users to the health services network.



Dispenser, Automatic and Medical Prescription

Telemedicine communication system

Sistema de comunicación por telemedicina

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Abstract

The objective of this project is to develop a telemedicine case as an innovative solution that integrates technology with remote healthcare services. This device is designed to provide comprehensive health monitoring by enabling the measurement and tracking of physiological parameters such as temperature, oxygen saturation, heart rate, respiratory rate, ECG, and glucose concentration remotely. The case is equipped with sensors connected to a WiFi module, facilitating the secure transmission and storage of data on an online platform. Biotelemedic has been developed as an intelligent and user-friendly device, with clear instructions allowing patients to perform measurements autonomously. Additionally, it supports remote medical consultations via video calls, connecting patients with their specialist physicians. The implementation of this telemedicine system will enhance access to quality medical services and optimize healthcare delivery, benefiting individuals who require continuous health monitoring. This tool not only extends the reach of medical care but also empowers patients to take an active role in managing their well-being, contributing to more efficient and accessible healthcare in the future

Telemedicine, Physiological Parameters, Smart Device

Design and mechanical analysis of bushings made from TPU using additive manufacturing and the finite element method

Diseño y análisis mecánico de bujes fabricados en TPU aplicando manufactura aditiva y empleando el método por elemento finito

CONTRERAS-CHÁVEZ, Axel A., VILLAGÓMEZ-MORENO, José, MANRÍQUEZ-PADILLA, Carlos G. and PÉREZ-CRUZ, Ángel

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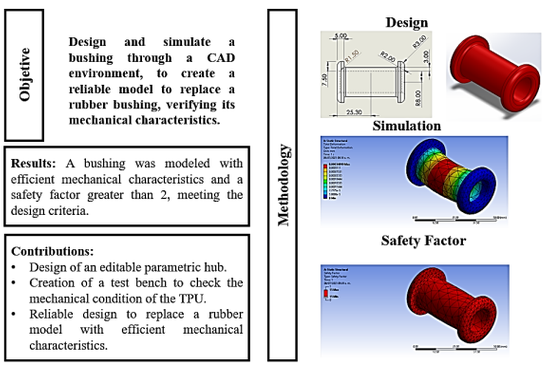
Abstract

The study focused on analyzing the mechanical behavior of a front suspension fork bushing for an all-terrain vehicle (ATV), manufactured using Thermoplastic Polyurethane (TPU) through additive manufacturing, specifically 3D printing. This technology enables the creation of customized designs, reduces production time, and minimizes material waste. TPU, an elastomer with remarkable physical and mechanical properties, was evaluated as a potential substitute for natural rubber, which is the primary material traditionally used for bushings in the automotive industry, especially in the production of tires, hoses, and seals. The analysis was conducted through CAD modeling and finite element simulations, subjecting the bushing to torsional and shear stresses typical of vehicular suspension systems. The results indicated that TPU could serve as a replacement material for the established requirements. Given that replacement parts are not always acquired in a timely manner, the study focuses on providing a viable alternative for the automotive industry.



TPU, Additive manufacturing, FEM

Design of a Three-Speed Automatic Transmission System with Reverse for All-Terrain Vehicles (ATV).

Diseño de un Sistema de transmisión automática de tres velocidades con reversa para vehículos todo terreno (ATV).

RAMÍREZ-CEJA, Axel Ivan, MANRÍQUEZ-PADILLA, Carlos Gustavo, PERÉZ-CRUZ, Angel and TORREZ-RICO, Luis Armando

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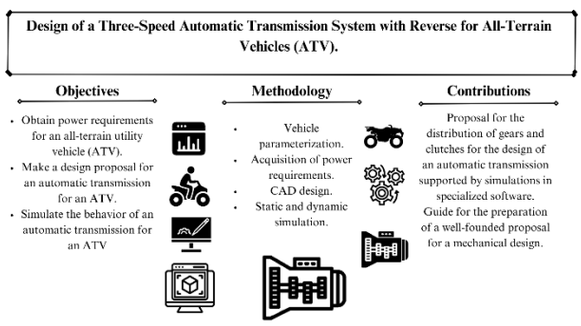
Abstract

This work proposes the design and simulation of a conventional three-speed automatic transmission, including reverse gear, for an all-terrain utility vehicle (ATV). The proposed design was generated considering the power requirements needed for the selected vehicle to operate on a specific driving cycle over uneven terrain with variable slopes ranging from -0.5° to 2.5°. A vehicle with well-defined mass, dimensions, and engine displacement was selected as the design criteria. Using the numerical software MATLAB, the power requirements were calculated, establishing that the transmission ratios range from 0.18 to 1. Using commercial Multibody Dynamics (MBD) software, ADAMS, the reliability of the proper functioning of the gear trains was determined based on boundary conditions. Similarly, to verify that the selected materials and components can withstand critical loads, structural static simulations were carried out using the finite element method with the commercial software ANSYS.



Finite element analysis, Simulation CAE, Automatic Transmission

Design and simulation of a suspension system for a four-wheeled HPV

Diseño y simulación de un sistema de suspensión para un HPV de cuatro ruedas

CONTRERAS-CHÁVEZ, Axel A., PÉREZ-CRUZ, Melissa Y., VILLAGÓMEZ-MORENO, José and MANRÍQUEZ-PADILLA, Carlos G.

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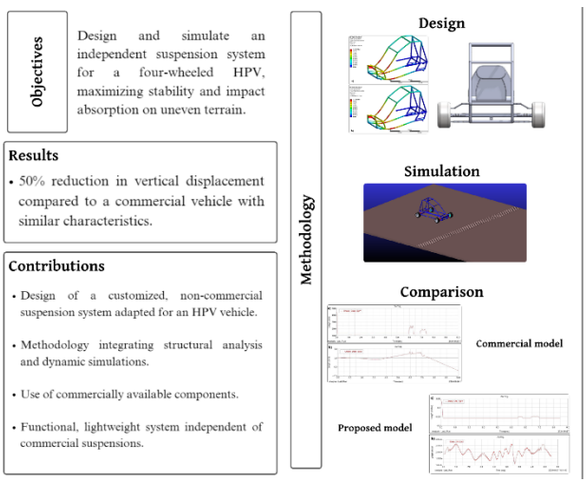
Abstract

This work presents the design and simulation of a suspension system for a four-wheel, single-rider human-powered vehicle (HPV) to enhance stability and maneuverability on uneven terrain. The system, designed with lightweight components such as springs and shock absorbers available on the market, avoids the use of complete commercial suspensions. Static structural analyses using finite element methods were conducted to evaluate materials and geometries, along with dynamic simulations in MSC ADAMSDD. A comparison of the vertical and lateral displacement of the center of mass between the proposed system and a similar commercial model showed a 50% reduction in vertical displacement. This system improves impact absorption and HPV stability while meeting functional requirements and using accessible materials, making it an effective and cost-efficient solution for this type of vehicle.



Mechanical-Design, FEA, Dynamic-Simulation

Evaluation of EPDM scrap/ natural fiber vulcanization by solvent swelling analysis

Evaluación de la vulcanización de scrap de EPDM/fibras naturales mediante análisis de hinchamiento por solventes

KANTUN-UICAB, María Cristina, ESTRADA-MONJE, Anayansi and RODRÍGUEZ-SÁNCHEZ, Isis

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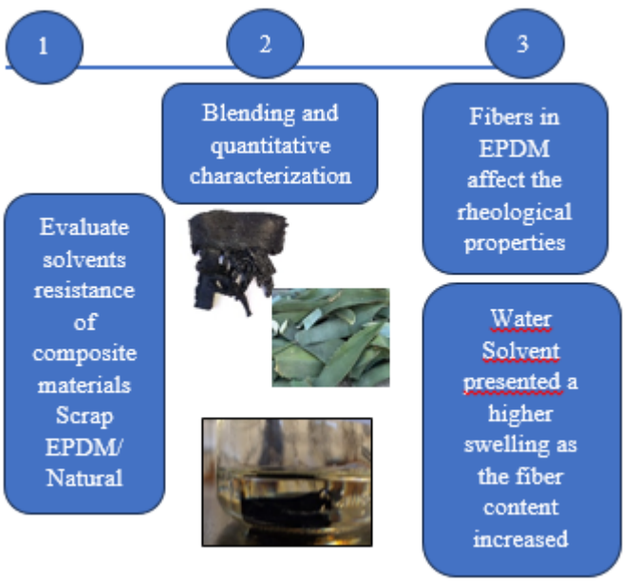
Abstract

In the rubber industry there is an opportunity to reuse unvulcanized rubber scrap generated during the formulation process, as well as to find alternatives for its use. For this reason, in this work the characterization of EPDM/natural fiber scrap with different proportions is studied through rheological and swelling studies according to the Flory Rehner Equation. The solvents used were distilled water, cyclohexane and toluene at different exposure times. The results found allow us to conclude that the fiber content in EPDM rubber does not affect the scorch time, the maximum vulcanization time. In the case of swelling analysis, the observed changes had a maximum increase of approximately 3% when the fiber content in the composite material increased when they were exposed to water and toluene, this was attributed to the characteristics of the EPDM studied in this work.



EPDM, Flory Rehner, Natural Fibers

Study of cooling system performance on lithium-ion batteries for an electric vehicle

Estudio del desempeño de un sistema de enfriamiento en baterías de iones de litio para un vehículo eléctrico

ZÚÑIGA-CERROBLANCO, José Luis, CONEJO-CHAVANDO, Luis Daniel, HUERTA-GÁMEZ, Héctor and PÉREZ-GÁRCIA, Víctor Lauro

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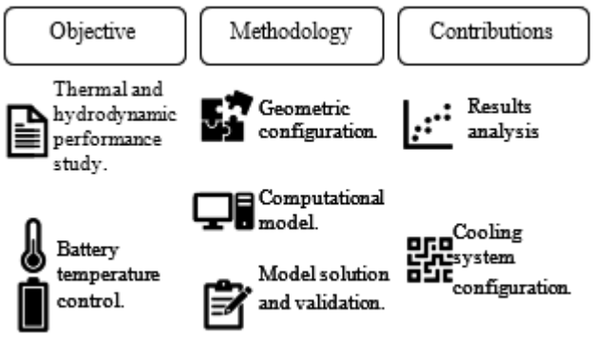
Abstract

The acquisition of electric vehicles has grown considerably, as a result, autonomy and safety became an opportunity for improvement, one of the main systems that involve autonomy and safety are batteries. The safety and the performance of the batteries are directly related to the temperature reached during charge and discharge operation. In this paper, a CFD study is carried out on the thermal and hydrodynamic performance of a cooling system used to prevent overheating of lithium-ion batteries used in electric vehicles. Air as cooling fluid is used, which is directed towards the battery cells to remove the heat generated by each of these cells. An in-line arrangement for the batteries is analyzed, different velocities and discharge rate to obtain temperature profiles on the cell surface are used, as well a total pressure drop along the cell array. The minimum inlet velocity which the working fluid must work to ensure adequate temperature of the battery cells in operation is found.



Lithium-Ion Battery, CFD, Cooling System

Selecting a suspension system for a mini-baja vehicle

Selección de un sistema de suspensión para un vehículo de tipo mini-baja

SÁNCHEZ-LERMA, Josué Rafael, CERRITO-TOVAR, Iván De Jesús, TORRES-RICO, Luis Armando and HUERTA-GÁMEZ, Héctor

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Abstract

The general objective of this work is to select a suspension system for a mini-baja vehicle. Among the specific objectives is the development of an analysis of the geometric and dimensional characteristics of the semi-independent suspension system and McPherson suspension system. The type of methodology that was used had a quantitative and qualitative approach, since it was not only intended to select the suspension system based on mathematical data provided by the simulation, but also on certain physical characteristics that the suspension system possesses. This work contributes to the development of new prototypes in terms of suspension systems, since it opens the way for competitive vehicles to analyze the suspension system that best adapts to both the conditions of their vehicles and the of the land itself, considering the qualitative and quantitative analyses.

Suspension system Geometric features finite elements

A Proposal for an IoT Operating System for Plug-n-Play Wireless Sensors

Propuesta de un Sistema Operativo para IoT para Sensores Inalámbricos Inteligentes tipo Plug-n-Play

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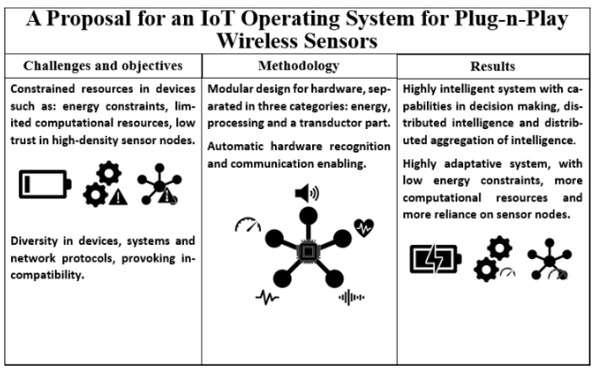
Abstract

The proposal is focused on the development of an operating system that reduces the gap in the needed technological knowledge for the installation of an intelligent environment. The aim is to develop an operating system that is sufficiently advanced to autonomously manage the inclusion of new devices, and that at hardware level becomes largely versatile to integrate new devices and components into the environment. The proposal is based on modular hardware composed on three main elements: a brain, a module (a transductor) and a power supply. Consequently, the software must be able to recognize the installed hardware and subsequently manage communication with other devices with minimal human intervention, being helped by algorithms and fuzzy logic. Therefore, the contribution focuses on the creation of ubiquitous and pervasive systems, where the system manages itself and benefit.



Ubiquitous Environments, Modular System, Autonomous Elements

Hydrodynamic analysis in three models of electrowinning reactor for silver recovery

Análisis hidrodinámico en tres modelos de reactor de electrodeposición para la recuperación de plata

MARTÍNEZ-VÁZQUEZ, José Merced, VARGAS-RAMÍREZ, Marissa, CORTÉS-CAMPOS, María de Lourdes and MORALES-CRUZ, Erick Uriel

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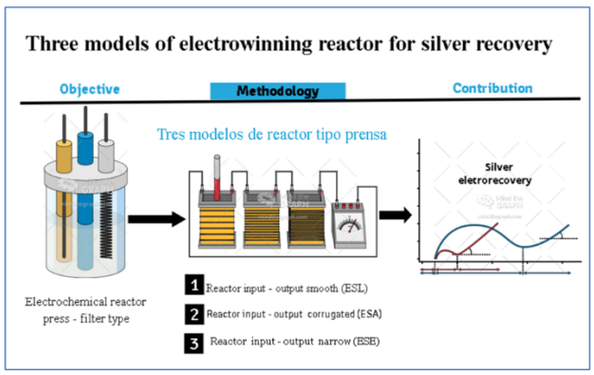
Abstract

In the present work, the hydrodynamic behavior of the electrolyte within the geometry of a press-type reactor was simulated and analyzed; for this purpose, three types of geometries with different dimensions were implemented. The simulation was carried out with COMSOL Multiphysics® software. COMSOL Multiphysics® is a modeling and analysis tool for virtual prototyping of physical phenomena. The equations used in the simulation were the Nernst-Planck equation, which is a mass conservation equation and is an extension of Fick's first diffusion law to include electrostatic forces and the moving mesh of the model; the momentum transport of the fluid flow was described by the steady-state Navier-Stokes equation, and the kinetics of the electrodes was described by the concentration-dependent Butler-Volmer expression. The results obtained showed the correlation between the hydrodynamic properties of the press-type reactor and the concentration of electrorecovered silver; with the current density supplied, concluding that the reactor geometry contributed to the 4% increase in the concentration of electrorecovered Ag (silver) in geometry three, with respect to the others.



Geometries, Hydrodynamic, Electrorecovery

Au (III) Recovery From Aqueous Systems

Recuperación de Au (III) de Sistemas Acuosos

SALAZAR-HERNÁNDEZ, Mercedes, ELORZA-RODRÍGUEZ, Enrique, SALAZAR-HERNÁNDEZ, Carmen and MENDOZA-MIRANDA, Juan Manuel

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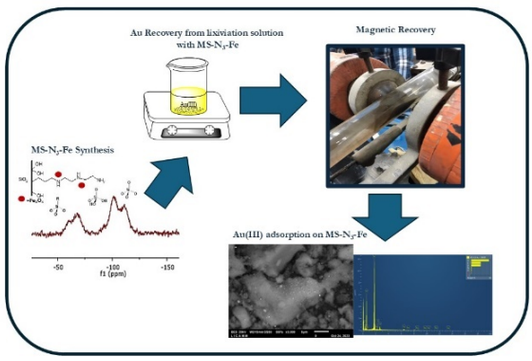
Abstract

The recovery of various metal ions in hydrometallurgical processes, whether from the ore or from the recycling of metals, is a multi-stage process that allows for the selective recovery of the metal ion of interest from the leach solutions. In this regard, the development of novel adsorbents represents a promising field of research for these processes. The present study examines the use of silica mesopores modified with magnetite (MS–N_3–Fe) in the removal of Au(III) in H_2O/HCl systems. The results show that MS–N_3–Fe is capable of quantitatively recovering Au(III) from aqueous solutions with high efficiency, with a removal capacity exceeding 95% across the entire concentration range investigated. The analysis of the adsorption kinetics demonstrated that the system exhibited a markedly tendency towards equilibrium, thereby establishing the viability of the $[AuCl_4]^-$ adsorption process with MSN_3–Fe.



Green Silica, Hydrometallurgy, Au (III) Recovery

Change phase materials: Wax Paraffin encapsulated in SiO2 and SiO2-Fe3O4

Materiales de cambio de fase: Parafina encapsulada en SiO2 y SiO2-Fe3O4

SALAZAR-HERNÁNDEZ, Carmen, SALAZAR-HERNÁNDEZ, Mercedes, VILLEGAS-ALCARAZ, José Francisco and MENDOZA-MIRANDA, Juan Manuel

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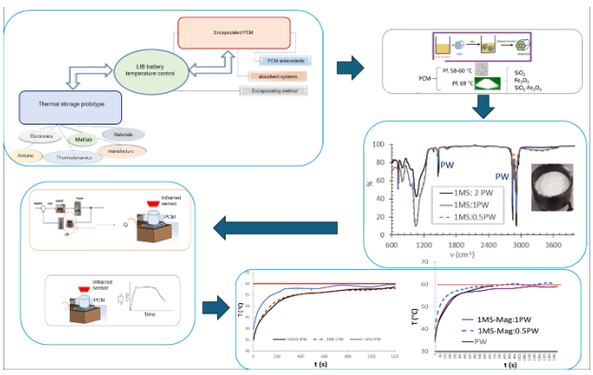
Abstract

Energy storage has become an essential aspect of modern energy processes, with a particular focus on enhancing the performance of thermal devices such as lithium batteries, which are widely regarded as a key technology in the transition to electric vehicles. In instances where the placement of heat removal systems is necessary to prevent the device from heating up, this paper study the storage capacity of a bioorganic phase-change material (PCM) encapsulated in silica nanoparticles. This PCM is obtained from sodium silicate (MS) and its modification with magnetite (MS-Fe_3O_4). The PCM was integrated into the silica matrix through impregnation, and infrared spectroscopy demonstrated the presence of its primary functional groups. Furthermore, thermal characterization curves were obtained, indicating a significant impact on the temperature holding time when the PCM was absorbed into the silica matrix modified with magnetite.



PCM; SiO_2; SiO_2/Fe_3O_4; energy

Anticorrosive SiO2-PDMS Ceramic Coating: Effect of viscosity and functional group on the siloxane chain

Recubrimiento Cerámico Anticorrosivo SiO2/PDMS: Efecto de la Viscosidad y Grupo Funcional en la Cadena Siloxano

SALAZAR-HERNÁNDEZ, Carmen, SALAZAR-HERNÁNDEZ, Mercedes, MENDOZA-MIRANDA, Juan Manuel and ELORZA-RODRÍGUEZ, Enrique

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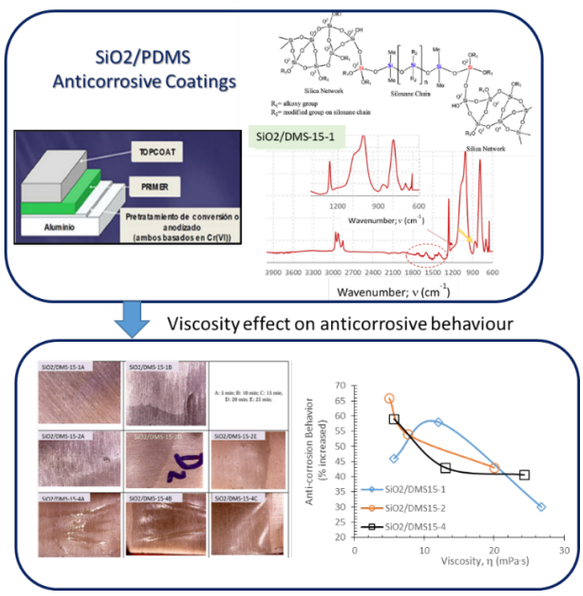
Abstract

Nowadays, a variety of techniques exist for mitigating the effects of corrosion, including the use of anticorrosive coatings. In this study, we investigate the impact of viscosity on the final quality of a silica/PDMS-based ceramic coating, synthesized through sol-gel methodology. The polycondensation of tetraethylorthosilicate (TEOS) with polydimethylsiloxane (PDMS) was conducted at concentrations of 10, 20, and 40 wt.%, employing DBTL as a catalyst. The coatings were deposited on Al-6061 surfaces via immersion. Infrared spectroscopy indicates the integration of the inorganic phase (SiO_2; 1100 cm^{-1}, 720 cm^{-1}) with the siloxane chain (PDMS; 2900 cm^{-1}, 1250 cm^{-1}, 920 cm^{-1}, 785 cm^{-1}). As the siloxane chain length increased, modifications to the silica structure were observed, with the appearance of signals at 889 cm-1, 867 cm-1, and 835 cm-1. Conversely, the gelation times are reduced in proportion to the PDMS content in the sol solution. Therefore, to obtain smooth and homogeneous finishes, different gelation times are required when applying solutions with viscosities between 5 and 12 mPa·s. These coatings exhibited the most significant increase in corrosion resistance, reaching approximately 75%.



Sio_2/PDMS; Viscosity, Corrosion Mitigating, Infrared Spectroscopy, Organic-Inorganic Coating

SiO2/PDMS Modified Porous Systems for Oil Removal: Reuse Cycles Studied

Modificación de Sistemas Porosos con SiO2/PDMS como Removedores de aceite: Estudio de Ciclos de Reuso

SALAZAR-HERNÁNDEZ, Carmen, SALAZAR-HERNÁNDEZ, Mercedes, MENDOZA-MIRANDA, Juan Manuel and LEÓN-REYES, María del Rosario

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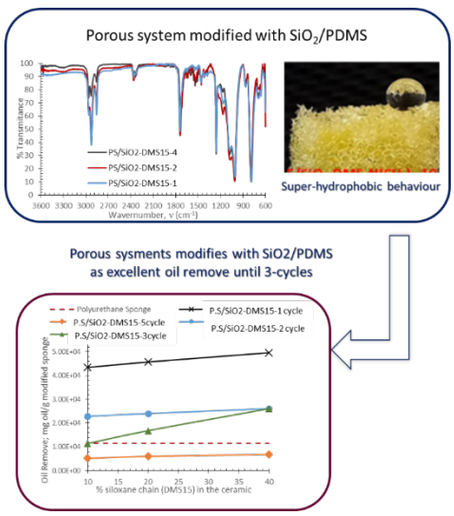
Abstract

Currently, water pollution is a global problem that must be addressed; since, added to the aridity cycles, they have caused a shortage of natural water resources. Therefore, improving wastewater treatment methods is a global research topic that needs to be developed. Among the contaminants present in wastewater (industry and domestic) are “oily substances” which are dispersed in the water, making their removal difficult. Therefore, this project seeks to determine the reuse capacity for an oily substance removal system designed from the modification of a porous medium with a hydrophobic ceramic (SiO2/PDMS) that contains in the structure of the siloxane chain the methyl functional group (-CH3). To do this, the liquid-liquid extraction of the oil removed from the sponge/ceramic was carried out using solvents such as: hexane and THF; determining the numbers of use cycles, identifying by infrared spectroscopy the modifications in the modified sponge after each use cycle.



Sio2/PDMS, Oil Remotion, Reuse-Cycles

Expansion and improvement of modular workstation for advanced PLC analysis and operation

Expansión y mejora de estación de trabajo modular para análisis y manejo avanzado de PLCs

RODRÍGUEZ-FRANCO, Martín Eduardo, JARA-RUIZ, Ricardo, ZACARÍAS-RODRÍGUEZ, Luis Gerardo and LÓPEZ-ÁLVAREZ, Yadira Fabiola

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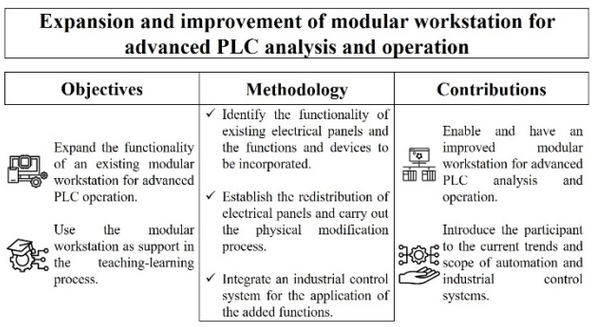
Abstract

This work provides continuity to the development of a modular workstation for the advanced operation of the programmable logic controller (PLC), through incorporation of the functions of master-slave communication, proportional-integral-derivative (PID) controller and high-speed counters (HSC); and its use as a support element for teaching process of related topics. The operation of the workstation constituted from the integration of a speed control system in a three-phase alternating current motor is analyzed; whose test parameters are entered from a graphical interface executed through a touch screen. Such application was implemented through a communication network between controllers; in addition, it uses a variable frequency drive (VFD) and an encoder as power and perception elements, respectively. The performance observed during the tests carried out confirms an adequate follow-up of assigned parameters, by reaching and settling real response of system in these. While, with regard to the use of the developed modular workstation as a teaching tool for analysis of advanced automation solutions, its relevance is confirmed.



Programmable Logic Controller, PLC Advanced Functions, Modular PLC Workstation

Theoretical comparison of two shell-and-tube heat exchangers by applying different correlations

Comparación teórica de dos intercambiadores de calor de carcasa y tubos aplicando diferentes correlaciones

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Abstract

This paper presents the theoretical analysis of heat transfer of two different shell and tube exchangers. The theoretical study was carried out with the creation of software in the EES programming the ε-NTU method, considering different correlations for the calculations of the external and internal convective coefficients as well as their geometry for each exchanger, finally performing a mass and energy balance. The theoretical results obtained in this analysis were: operating conditions at the exit of the casing and tubes, efficiencies and total heat transferred in both exchangers, the results obtained were validated with results from other researchers.

Objetives	Methodology	Contribution
Calculate the outlet temperatures of the 2 heat exchangers with different geometric configuration using different correlations for the convective coefficients and with the ε-NTU method.	The method used was the ε-NTU to calculate the outlet temperatures of the shell and tube fluids with the help of correlations to calculate the internal and external convective coefficients and obtain the overall heat transfer coefficient.	We contributed to suggesting a method for calculating the outlet temperatures where the ε-NTU method was used, different correlations for the internal and external convective coefficients, dimensions and geometries of the heat exchangers, finally validating these results with numerical simulations in CFD .

Correlations, Global Transfer Coefficient, Internal And External Convective Coefficients, Ɛ-NTU Method

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