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Boletín de Inteligencia Tecnológica - UiiT es una publicación bimestral editada por la Alianza FiiDEM, AC. Registros y permisos en trámite.

Presentación

Esta segunda edición del *Boletín Inteligencia Tecnológica* tiene como objetivo publicar información sobre los resultados y experiencias que se obtienen en el mundo científico y empresarial que día a día aportan a los procesos de innovación. Además, constituye una vía de divulgación e intercambio de información entre empresas, centros de investigación, sociedades técnicas e instituciones gubernamentales y está enfocado en temas de interés para el desarrollo de infraestructura en México.

Es producto del trabajo de los participantes en el *Programa de Aceleración del Conocimiento en Inteligencia Tecnológica* de la Unidad de Información e Inteligencia Tecnológica de la Alianza FiiDEM, AC, y se enfoca en: concreto y adiciones, corrosión producida por H_2S y CO_2 en ductos petroleros y sistemas de almacenamiento para redes inteligentes (*smart grid*).

Presenta una recopilación de artículos y patentes que fueron publicados o desarrollados en los meses de julio y agosto del presente año, así como los eventos a realizarse en los próximos meses en torno a dichos temas.

Para nosotros es muy importante contar con su retroalimentación de manera que podamos integrar un producto a la medida de sus necesidades.

Unidad de Información e Inteligencia Tecnológica
Alianza FiiDEM, AC

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Materiales

Efecto de las cenizas volantes y del humo de sílice en la resistencia a la compresión del concreto autocompactable sometido a diferentes condiciones de curado
This study presents an experimental study on self-compacting concrete (SCC) with two cement content. The work involves three types of mixes, the first consisted of different percentages of fly ash (FA), the second uses different percentages of silica fume (SF), and the third uses a mixture of FA and SF. After each mix preparation, nine cylinder specimens are cast and cured. Three specimens are cured in water for 28 days, three specimens are cured in water for 7 days, and three specimens are left in air for 28 days. The slump and V-funnel test are carried out on the fresh SCC and concrete compressive strength values are determined. The results show that SCC with 15% of SF gives higher values of compressive strength than those with 30% of FA and water cured specimens for 28 days give the highest values of compressive strength.

Fuente: *Ain Shams Engineering Journal*. Article in Press, Available online 2 July 2011. Corrected Proof. Heba A. Mohamed. Department of Structural Engineering, Faculty of Engineering, Zagazig University, Egypt.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S2090447911000141

Producción sustentable de cemento – presente y futuro
Cement will remain the key material to satisfy global housing and modern infrastructure needs. As a consequence, the cement industry worldwide is facing growing challenges in conserving material and energy resources, as well as reducing its CO_2 emissions. According to the International Energy Agency, the main levers for cement producers are the increase in energy efficiency and the use of alternative materials, be it as fuel or raw materials. Accordingly, the use of alternative fuels has already increased significantly in recent years, but potential for further increases still exists. In cement, the reduction of the clinker factor remains a key priority: tremendous progress has already been made. Nevertheless, appropriate materials are limited in their regional availability. New materials might be able to play a role as cement constituents in the future. It remains to be seen to what extent they could substitute Portland cement clinker to a significant degree.

Fuente: *Cement and Concrete Research*, vol. 41, issue 7, July 2011, pages 642-650. M. Schneider, M. Romer, M. Tschudin, H. Bolio. VDZ, Düsseldorf, Germany; Holcim Group Support Ltd, Holderbank, Switzerland y CEMEX, Monterrey, México.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0008884611000950

Resistencia a la compresión y resistencia a la penetración de iones cloruro y a la carbonatación de mezclas de concreto elaborado con agregados reciclados, en las que se varía la cantidad de cenizas volantes y de agregados finos reciclados
Construction and demolition waste has been dramatically increased in the last decade, and social and environmental concerns on the recycling have consequently been increased. Recent technology has greatly improved the recycling process for waste concrete. This study investigates the fundamental characteristics of concrete using recycled concrete aggregate (RCA) for its application to structural concrete members. The specimens used 100% coarse RCA, various replacement levels of natural aggregate with fine RCA, and several levels of fly ash addition. Compressive strength of mortar and concrete which used RCA gradually decreased as the amount of the recycled materials increased. Regardless of curing conditions and fly ash addition, the 28 days strength of the recycled aggregate concrete was greater than the design strength, 40 MPa, with a complete replacement of coarse aggregate and a replacement level of natural fine aggregate by fine RCA up to 60%. The recycled aggregate concrete achieved sufficient resistance to the chloride ion penetration. The measured carbonation depth did not indicate a clear relationship to the fine RCA replacement ratio but the recycled aggregate concrete could also attain adequate carbonation resistance. Based on the results from the experimental investigations, it is believed that the recycled aggregate concrete can be successfully applied to structural concrete members.

Fuente: *Waste Management*, vol. 31, issue 11, November 2011 (Available online 23 July), pages 2352-2360. Jongsung Sim and Cheolwoo Park. Department of Civil Engineering, Hanyang University, Republic of Korea and Department of Civil Engineering, Kangwon National University, Republic of Korea.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0956053X11002790

Alta resistencia al fuego en los bloques que contienen cenizas volantes y cenizas de fondo, productos de la combustión del carbón
Fire resistance recycled blocks, containing fly ash and bottom ash from coal combustion power plants with a high fire resistance, are studied in this paper by testing different compositions using Portland cement type II, sand, coarse aggregate and fly ash (up to 50% of total weight) and bottom ash (up to 30% of total weight). The fire resistance, physical–chemical

(density, pH, humidity, and water absorption capacity), mechanical (compressive and flexural strength), and leaching properties are measured on blocks made with different proportions of fly ash and bottom ash. The standard fire resistance test is reproduced on 28 cm-high, 18 cm-wide and 3 cm-thick units, and is measured as the time needed to reach a temperature of 180°C on the non-exposed surface of the blocks for the different compositions.

The results show that the replacement of fine aggregate with fly ash and of coarse aggregate with bottom ash have a remarkable influence on fire resistance and cause no detriment to the mechanical properties of the product. Additionally, according to the leaching tests, no environmental problems have been detected in the product. These results lead to an analysis of the recycling possibilities of these by-products in useful construction applications for the passive protection against fire.

Fuente: *Waste Management*, vol. 31, issue 8, August 2011, pages 1783-1789. Celia García Arenas, Madelyn Marrero, Carlos Leiva, Jaime Solís-Guzmán, and Luis F. Vilches Arenas. Department of Chemical and Environmental Engineering, E.S. Ingenieros Industriales, University of Seville, Spain. Department of Building Construction II, E.T.S. de Ingeniería de Edificación, University of Seville, Spain

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0956053X11001620

Efecto de la alta temperatura en la resistencia a la tensión de diferentes tipos de concreto de alta resistencia

The strength and stiffness properties of concrete deteriorate with an increase in temperature as encountered during exposure to fire. High-temperature tensile strength is crucial in evaluating the extent of spalling and fire resistance of concrete structures. This paper presents the variation of tensile strength of new types of concrete as a function of temperature. Specimens made of high-strength concrete (HSC); fiber-reinforced concrete (with steel, polypropylene, and hybrid fibers); self-consolidating concrete; and fly-ash concrete are tested at various temperatures in the 20 to 800°C (68 to 1472°F) range to measure splitting tensile strength. The test results indicate that the presence of steel and hybrid fibers slows the loss of tensile strength of concrete with temperature. Data generated in these tests are used to develop simple relationships for expressing tensile strength as a function of temperature. These relationships can be used as an input parameter in computer models for evaluating the spalling and fire resistance of HSC structural members.

Fuente: *ACI Materials Journal*, vol. 108, issue 4, July-August 201, pages 394-402. Khaliq, W.; Kodur, V.K.R.; ISSN: 0889325X; Publisher: American Concrete Institute.

Leer completo en: http://www.concrete.org/PUBS/JOURNALS/OLJDetails.asp?Home=MJ&ID=51683112

Diseño basado en desempeño y carbonatación de concreto con alto contenido de cenizas volantes

This paper reports on an investigation of the durability of high-volume fly ash concrete exposed to carbonation (XC class in EN 206-1 standard). The reduction of cement content is assumed to mitigate CO_2 emissions due to the production of Portland cement clinker. The durability of concrete is assessed through a performance-based approach. First, a performance-based method was applied to design a concrete mixture with more than 50% substitution of cement by fly ash. To cope with the high viscosity of the so-obtained mixture, an air-entraining agent was used. Due to its low cement content, the so-obtained mixture does not comply with the prescriptive requirements of the European standard (EN 206-1). Thus, according to the equivalent performance concept, its potential durability has to be proved through comparison with reference mixtures complying with prescriptive standard requirements. The performance-based evaluation of the durability of the designed mixture and reference mixtures (with Portland cement and blended cement) consisted in porosity and accelerated carbonation tests. The influence of curing mode and thermal treatment duration before carbonation test were also investigated. Whatever the curing mode, the designed mixture was found as resistant to accelerated carbonation as the reference mixture containing blended cement.

Fuente: *Cement and Concrete Composites*, In Press, Accepted Manuscript, Available online 27 August 2011-A, pages 01-08. Younsi, P. Turcry, E. Rozière, A. Aït-Mokhtar, A. Loukili. Université de La Rochelle, LEPTIAB, La Rochelle, France and Institut de Recherche en Génie Civil et Mécanique (GeM), UMR-CNRS 6183, Ecole Centrale de Nantes, Nantes, France.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0958946511001259

Comparativo de la durabilidad entre el cemento Portland ordinario y cemento con escoria de acero, bajo diferentes condiciones ambientales

In this work, the durability performances of mortars made with an ordinary Portland cement and a slag cement, were tested. These mortars were exposed to four different constant temperature and relative humidity during 365 days. The measured properties of both cement types are affected by the environment, but the durability of slag cement mortars is more influenced by temperature and the durability of OPC mortars is more influenced by the relative humidity. The obtained results show that the slag cement mortars hardened under non-optimal environmental conditions have good durability at any hardening age, even better than Portland cement.

Fuente: *Construction and Building Material*, Available online 25 August 2011. J.M. Ortega, I. Sánchez, and M.A. Climent. Departament d'Enginyeria de la Construcció, Obres Públiques i Infraestructura Urbana, Universitat d'Alacant, Spain.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0950061811004302

Efecto de los aditivos minerales en las propiedades mecánicas, la permeabilidad de iones cloruro y la impermeabilidad del concreto autocompactable

The objective of this study was to evaluate the effectiveness of various mineral admixtures in producing self-compacting concrete (SCC). For this purpose, fly ash (FA), granulated blast furnace slag (GBFS), limestone powder (LP), basalt powder (BP) and marble powder (MP) were used. Workability of SCC was determined using slump flow, T50 time, L-box and V-funnel tests. The hardened properties that were determined included ultrasonic pulse velocity and compressive strength determined at 7 and 28 days. It was concluded that among the mineral admixtures used, FA and GBSF significantly increased the workability of SCC. Durability properties of SCC mixtures such as, chloride ion permeability and water impermeability have been investigated besides mechanical properties within the scope this study. Test results indicated that SCC could be obtained with not only LP which the most common filler material in SCC applications but also BP and MP as filler materials. Replacing 20% of Portland cement (PC) with GBFS resulted in strength of more than 78 MPa at 28 days. Furthermore, the best resistance to chloride ion permeability was obtained from a combination of 60% GBFS with 40% PC. On the other hand, impermeability depth test results were in the range of 4.42–12.58 mm.

Fuente: *Construction and Building Materials*, Available online 20 August 2011. Mucteba Uysal, Kemalettin Yilmaz and Metin Ipek. Sakarya University, Civil Engineering Department, 54187 Sakarya, Turkey and Sakarya University, Construction Education Department, 54187 Sakarya, Turkey.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S095006181100403X

Energía

Más allá de las redes inteligentes. La necesidad de redes de energía inteligentes para una mayor eficiencia global mediante la integración de vectores de energía

The most correct scenario for a sustainable energy future foresees no predominance of one source over the others in any area of the world but a proper energy mix, based on locally available resources and needs. The concept and role of energy vectors is key: "[an energy vector] allows transfer, in space and time, a given quantity of energy, hence making it available for use distantly in time and space from the point of availability of the original source". Therefore, a scenario that gives full scope for the ES to be immune from the characteristics of non-sustainable resource consumption and waste production, the system itself must shift the focus from resources to vectors (mainly electricity, hydrogen, heat). Smart grids have been largely indicated as an answer for their characteristic "needful design" to move from the "old" grids (unidirectional power flows) to "new" bi-directional electricity networks. This is not enough: the real need is for an intelligent management of a complete set of energy sources and vectors, as electricity, heat, hydrogen, bio and non-biofuels, that requires a clear shift that goes beyond smart grids and looks at Intelligent Energy Networks.

Fuente: *International Journal of Hydrogen Energy*, vol. 36, issue 13, July 2011, pages 8126-8133. Fabio Orecchini and Adriano Santiangeli. Department of Mechanics and Energy and "Guglielmo Marconi" University.

Leer completo en: http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6V3F-529C3GB-8-1&_cdi=5729&_user=945819&_pii=S0360319911002928&_origin=gateway&_coverDate=07%2F31%2F2011&_sk=999639986&view=c&wchp=dGLbVzW-zSkWA&md5=3ec041acf81a33aeb0714b4ebf07edfe&ie=/sdarticle.pdf

Estudios sobre la capacidad de seguridad de parques eólicos conteniendo sistemas de almacenaje de energía VRB

This paper proposes into determining the security capacity of wind farms containing VRB energy storage system. To achieve these we firstly build the model of the doubly fed induction generator and VRB model. After studying their characteristic, a study case of local grid integrated with a wind farm is simulated in Matlab/PSAT. Finally security capacity of the wind farm under several situations is studied. It concluded that the energy storage devices have significant influence on the security capacity of the wind farm.

Fuente: *International Conference on Electric Utility Deregulation and Restructuring and Power Technologies (DRPT)*, 2011 4th, July 2011, pages 1704 – 10708. Biao, Mao; Bingyin, Wu; Buhan, Zhang; and Guanglong, Xie. College of Electrical and Electronic Engineering Huazhong University of Science and Technology Wuhan, China.

Leer completo en: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5994172

Desarrollo de un sistema de generación distribuida basado en diferentes fuentes de energía renovable

In promotion of the new energy policy, the large-scale expansion of constructions of the wind and solar power is developing in China, whose random high-power electric energy fluctuation causes huge shock to the power grid. Confronting this important problem of the power system safe operation, it is really top urgent to build a feasible solution to develop the large-scale new energy. Therefore, this paper raises a distributed generation system based on various renewable energy resources, adopting a small-sized combined generation equipments of unit capacity 100 kW max with wind, solar and biogas energies, and super capacitor and battery storage devices, which builds and installs near to the local loads center to supply it optimally in stable and safe, high reliability and less feeder loss mode. The operation performance of the demonstration project shows: the distributed generation system based on various

renewable energy resources is an effective and feasible approach for its large-scale and efficient utilization purpose because of its particular distribution characteristics, direct power supply to the local loads and its little influence to the grid.

Fuente: *Control Conference (CCC)*, 2011 30th Chinese, July 2011, pages 6203 – 6207. Ma, Yiwei; Yang, Ping; and Guo, Hongxia. College of Electric Power, South China University of Technology, Guangdong Key Laboratory of Clean Energy Technology, Guangzhou, China.

Leer completo en: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6000940

Sistemas de almacenamiento de energía fijo y móvil para redes inteligentes

Renewable energy is a key technology in reducing global carbon dioxide emissions. Currently, penetration of intermittent renewable energies in most power grids is low, such that the impact of renewable energy's intermittency on grid stability is controllable. Utility scale energy storage systems can enhance stability of power grids with increasing share of intermittent renewable energies. With the grid communication network in smart grids, mobile battery systems in battery electric vehicles and plug-in hybrid electric vehicles can also be used for energy storage and ancillary services in smart grids. This paper will review the stationary and mobile battery systems for grid voltage and frequency stability control in smart grids with increasing shares of intermittent renewable energies. An optimization algorithm on vehicle-to-grid operation will also be presented.

Fuente: *Electric Utility Deregulation and Restructuring and Power Technologies (DRPT)*, 2011 4th International Conference on, July 2011, pages 1 – 6. Wong, Y. S.; Lai, L. L.; Gao, Shuang; and Chau, K. T. Energy Strategy, Planning, Policy Support, Research and Development Centre, State Grid Energy Research Institute, Beijing, China.

Leer completo en: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5993853

Análisis de métricas, beneficios y desafíos para proyectos de redes inteligentes

This paper describes approaches to determine metrics, costs, and benefits from Smart Grid field projects including the 140 Smart Grid Investment Grants and Smart Grid Demonstration Projects funded by the U.S. Department of Energy (DOE) through the American Recovery and Reinvestment Act.

The paper describes DOE's metrics and benefits framework that links Smart Grid technologies with their applications and the benefits that result from those applications. Benefits are derived by comparison of grid performance before and after installation and operation of Smart Grid components. These benefits are accrued to utilities/ratepayers, consumers, and society. There are significant challenges in attempting to collect field information and convert the information to metrics, costs, and benefits. For example, determining the monetary value of performance benefits such as reduced environmental emissions, reduced outages, and reduced peak load requires assumptions based on experience and must be rooted in solid technical and financial bases.

Fuente: *Energytech 2011 IEEE*, July 2011, pages 1 – 5. S. J. Bossart, Team Lead, U.S. Department of Energy, and J. E. Bean, Project Manager, U.S.Department of Energy.

Leer completo en: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5948539

Fabricación y caracterización textural de los electrodos de carbono nanoporosos con nanopartículas de CuO para supercapacitores

We introduce a novel strategy of fabricating nanoporous carbons loaded with different amounts of CuO nanoparticles via a hard templating approach, using copper-containing mesoporous silica as the template and sucrose as the carbon source. The nature and dispersion of the CuO nanoparticles on the surface of the nanoporous carbons were investigated by x-ray diffraction (XRD), high-resolution scanning electron microscopy (HRSEM) and high-resolution transmission electron microscopy (HRTEM). XRD results reveal that nanoporous carbons with embedded CuO nanoparticles exhibit a well-ordered mesoporous structure, whereas the nitrogen adsorption measurements indicate the presence of excellent textural characteristics such as high surface area, large pore volume and uniform pore size distribution. The amount of CuO nanoparticles in the nanochannels of the nanoporous carbon could be controlled by simply varying the Si/Cu molar ratio of the mesoporous silica template. Morphological characterization by SEM and TEM reveals that high-quality CuO nanoparticles are distributed homogeneously within the nanoporous carbon framework. The supercapacitance behavior of the CuO-loaded nanoporous carbons was investigated. The material with a small amount of CuO in the mesochannels and high surface area affords a maximum specific capacitance of 300 F g^{-1} at a 20 mV s^{-1} scan rate in an aqueous electrolyte solution. A supercapacitor containing the CuO-loaded nanoporous carbon is highly stable and exhibits a long cycle life with 91% specific capacitance retained after 1000 cycles.

Fuente: *Science and Technology of Advanced Materials*, vol. 12, issue 4, July 2011. Kumaresa P S Prasad, Dattatray S Dhawale, Thiripuranthagan Sivakumar, Salem S Aldeyab, Javaid S M Zaidi, Katsuhiko Ariga and Ajayan Vinu.

Leer completo en: http://iopscience.iop.org/1468-6996/12/4/044602

Tecnologías dinámicas, estocásticas, computacional y escalables para las redes inteligentes

The smart electric power grid will evolve into a very complex adaptive system under semi- autonomous distributed control. Its spatial and temporal complexity, non- convexity, non- linearity, non- stationarity, variability and uncertainties exceed

the characteristics found in today's traditional power system. The distributed integration of intermittent sources of energy and plug- in electric vehicles to a smart grid further adds complexity and challenges to its modeling, control and optimization. Innovative technologies are needed to handle the growing complexity of the smart grid and stochastic bidirectional optimal power flows, to maximize the penetration of renewable energy, and to provide maximum utilization of available energy storage, especially plug- in electric vehicles.

Smart grids will need to be monitored continuously to maintain stability, reliability and efficiency under normal and abnormal operating conditions and disturbances. A combination of capabilities for system state prediction, dynamic stochastic power flow, system optimization, and solution checking will be necessary. The optimization and control systems for a smart-grid environment will require a computational systems thinking machine to handle the uncertainties and variability that exist. The importance and contributions of the computational intelligence field for developing the dynamic, stochastic, computational, and scalable technologies needed for sense-making, situational awareness, control and optimization in smart grids are presented in this paper.

Fuente: *IEEE Computational Intelligence Magazine*, vol. 6, issue 3, August 2011, pages 22 – 35. Ganesh Kumar Venayagamorthy. Missouri University of Science and Technology, USA.

Leer completo en: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5952102

El valor del almacenamiento de la energía del aire comprimido en energía y mercados de reserva

Storage devices can provide several grid services, however it is challenging to quantify the value of providing several services and to optimally allocate storage resources to maximize value. We develop a co-optimized Compressed Air Energy Storage (CAES) dispatch model to characterize the value of providing operating reserves in addition to energy arbitrage in several U.S. markets.We use the model to: (1) quantify the added value of providing operating reserves in addition to energy arbitrage; (2) evaluate the dynamic nature of optimally allocating storage resources into energy and reserve markets; and (3) quantify the sensitivity of CAES net revenues to several design and performance parameters.We find that conventional CAES systems could earn an additional $23 ± 10/kW-yr by providing operating reserves, and adiabatic CAES systems could earn an additional $28 ± 13/kW-yr. We find that arbitrage-only revenues are unlikely to support a CAES investment in most market locations, but the addition of reserve revenues could support a conventional CAES investment in several markets. Adiabatic CAES revenues are not likely to support an investment in most regions studied. Modifying CAES design and performance parameters primarily impacts arbitrage revenues, and optimizing CAES design will be nearly independent of dispatch strategy.

Fuente: *Energy*, vol. 36, issue 8, August 2011, pages 4959 – 4973. Drury, Easan; Denholm, Paul; and Sioshansi, Ramteen. National Renewable Energy Laboratory and Ohio State University.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0360544211003665

Estudio de un método de operación basado en el balance de una micro red independiente que utiliza un electrolizador de agua con energía solar y una bomba de calor eléctrica

A completely energy-independent microgrid (green microgrid) was examined in this work with the aims of abating greenhouse gas emissions by spreading the use of green energy, providing energy backup systems for disaster, and increasing the energy utilization efficiency with the use of exhaust heat. This paper analyzed the energy supply to six houses in a cold region. The green microgrid consisted of photovoltaics, water electrolyzers, proton-exchange membrane fuel cells (PEFCs), and heat pumps. To investigate the operation method and the capacity of each piece of equipment in the arrangement, a distributed system with two or more sets of equipment and a central system with one set of equipment were analyzed by a genetic algorithm. By introducing the prior energy need pattern of a cold region into the proposed system, the operation method and equipment capacity based on the power and heat balance were clarified. By introducing the partial load performance of a water electrolyzer and a PEFC into the analysis program, the operation method of each system was investigated. It was found that the area of a solar cell of a distributed system could be reduced by 12% as compared to a central system.

Fuente: *Energy*, vol. 36, issue 8, August 2011, pages 5200 – 5213. Shin'ya Obara a; Seizi Watanabe; and Balaji Rengarajan. Power Engineering Laboratory, Department of Electrical and Electronic Engineering, Kitami Institute of Technology.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0360544211003999

Retos de las baterías recargables

Strategies for Li-ion batteries that are based on lithium-insertion compounds as cathodes are limited by the capacities of the cathode materials and by the safe charging rates for Li transport across a passivating SEI layer on a carbon-based anode. With these strategies, it is difficult to meet the commercial constraints on Li-ion batteries for plug-in-hybrid and all-electric vehicles as well as those for stationary electrical energy storage (EES) in a grid.

Existing alternative strategies include a gaseous O_2 electrode in a Li/air battery and a solid sulfur (S_8) cathode in a Li/S battery. We compare the projected energy densities and EES efficiencies of these cells with those of a third alternative, a Li/Fe(III)/Fe(II) cell containing a redox couple in an aqueous solution as the cathode. Preliminary measurements indicate proof of concept, but implementation of this strategy requires identification of a suitable Li^+-ion electrolyte.

Fuente: *Journal of Power Sources*, vol. 196, issue 16, August

2011, pages 6688–6694. J.B. Goodenough, Youngsik Kim.

Leer completo en: http://atom.me.gatech.edu/zhut/Refer/Goodenough/Goodenough_JPS10.pdf

Corrosión

Inhibidores verdes para la protección contra la corrosión de metales y aleaciones – Una visión general

The use of inhibitors is one of the best options of protecting metals and alloys against corrosion. The toxicity of organic corrosion inhibitors to the environment has prompted the search for green corrosion inhibitors as they are biodegradable and do not contain heavy metals or other toxic compounds.

Investigations of corrosion inhibiting abilities of tannins, alkaloids, organic, amino acids and organic dyes of plant origin are of interest, as in addition to being environmentally friendly and ecologically acceptable, plant products are inexpensive, readily available and renewable sources of materials. In recent years, sol-gel coatings doped with inhibitors developed show real promise. Although substantial research has been devoted to corrosion inhibition by plant extracts, reports on the detailed mechanisms of the adsorption process, identification of the active ingredient are still scarce. Development of computational modeling backed by wet experimental results would help to fill this void and help understand the mechanism of inhibitor action, their adsorption patterns and the inhibitor-metal surface interface and aid the development of designer inhibitors with an understanding of the time required for the release of self healing inhibitors. The present review consciously restricts itself mainly to plant materials as green corrosion inhibitors.

Fuente: *International Journal of Corrosion*, 17 June 2011 (in press), pages 01 – 33. B.E. Amitha Rani and Bharathi Bai J Bas. Surface Engineering Division, CSIR- National Aerospace Laboratories Bangalore – 560037.

Leer completo en: http://www.hindawi.com/journals/ijc/aip/380217.pdf

Evaluación del efecto de un inhibidor de corrosión-erosión de API-5L-X65 en condiciones de flujos multi-fase de chorro

Erosion corrosion of pipeline steel API-5L-X65 has in recent years become an important issue due to the high sand production rate and watercut in the maturing assets. The scope of using corrosion inhibitor to mitigate erosion–corrosion arises due to a number of industrial demands. The present study has been conducted to assess the performance of API-5L-X65 and the effect of corrosion inhibitor under high velocity (20 m s^{-1}) jet impingement in four types of media containing 1.5 wt% sand particles: synthetic Forties brine, Forties brine with 5 vol% hydrocarbon (ISOPAR M), Forties brine and 100 ppm corrosion inhibitor, and Forties brine containing 5% ISOPAR M and 100 ppm corrosion inhibitor. Under jet impingement, the material loss was determined by gravimetric measurements and it is shown that the presence of corrosion inhibitor or hydrocarbon reduces the total material degradation of the pipeline steel in Forties brine. The most significant reduction in material loss rate for pipeline steel appears to result from the media containing both hydrocarbon and corrosion inhibitor in this study where an extremely strong interaction is observed. In situ electrochemistry combined with surface analysis and CFD simulations of the jet impingement have enabled the degradation mechanisms to be studied for different erosion–corrosion conditions.

Fuente: *Wear*, vol. 271, issues 9 – 10, 29 July 2011, pages 1432 – 1437. Xinming Hu, Khaled Alzawai, Abinesh Gnanavelu, Anne Neville, Chun Wang, Alan Crossland, and John Martin. Institute of Engineering Thermofluids, Surfaces and Interfaces, School of Mechanical Engineering, The University of Leeds, Exploration Production Technology, Building H, BP Exploration, Chertsey Road, Sunbury-on-Thames, Middlesex TW16 7LN,UK.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0043164811003073

Inhibición de la corrosión de aceros en solución de HCl 1 M por diversos extractos de hojas de *Xylopia Ferruginea*

The influence of *Xylopia ferruginea* leaves extract and partitions in different solvents on the corrosion behavior of mild steel (MS) in 1 M HCl was studied using weight loss, potentiodynamic polarization, electrochemical impedance spectroscopy (EIS) and Scanning Electron Microscope (SEM) techniques. The results revealed that *Xylopia ferruginea* was an excellent green inhibitor and the inhibition efficiencies obtained from weight loss and electrochemical experiments were in good agreement. Potentiodynamic polarization studies clearly reveal that all inhibitors behaved as mixed-type inhibitors with predominant anodic effectiveness. The Nyquist plots showed that on increasing the inhibitor concentration, the charge transfer resistance increased and the double layer capacitance decreased. The adsorption of inhibitors on MS surface obeys the Langmuir adsorption isotherm. SEM studies confirmed that the corrosion protection of MS was by the adsorption of inhibitors. The effectiveness as corrosion inhibitors is in the order of chloroform partition (CP) > *n*-hexane partition (HP) > methanol extracts (ME).

Fuente: *Int. J. Electrochem. Sci.*,vol.6, issue 1, 01 July 2011, pages 2998- 3016. Elyn Amira, A.A. Rahim, H. Osman, K. Awang, and P. Bothi Raja. School of Chemical Sciences, University Sains Malaysia and Departament of Chemistry, Faculty of Science, University Malaya.

Leer completo en: http://www.electrochemsci.org/papers/vol6/6072998.pdf

Comportamiento electroquímico de la corrosión del acero tubular con altos contenidos de H_2S y CO_2

There were little works about electrochemical corrosion behaviors that appeared in high H_2S and CO_2 containing environment. In this work, the electrochemical behaviors of tubular steel API-P110 in buffered acidic NaCl solutions saturated with high H_2S and CO_2 containing gases, were investigated by

potentiodynamic sweep technique. Analysis of the results shows corrosion density declines with increasing CO_2 content in H_2S/CO_2. The corrosion potential of steel moves towards more negatively with the increase of CO_2 content in H_2S/CO_2. In pH 2.9 solution, Passivity appears in high H_2S and CO_2, but no passivity shows in due to decreasing in high H_2S. In pH 5.3 solution, cathodic liming density comes out and increases with the increasing CO_2 content in H_2S/CO_2, however, no cathodic liming density comes out in H_2S.

Fuente: *Advanced Materials Research*, vols. 284 – 286, 04 July 2011, pages 2131 – 2135. Hongda Deng, Chunfu Li, Xianlong Cao, and Meiyu Zhao. School of Metallurgical and Materials Engineering, Chongqing University of Science and Technology, School of Materials Science and Engineering, Southwest Petroleum University.

Leer completo en: http://www.scientific.net/AMR.284-286.2131.pdf

Análisis cuantitativo del efecto combinado de múltiples factores de corrosión interna con CO_2 en gasoducto de recolección
The qualitative analysis of combined effect of multiple factors on internal corrosion in the gas gathering pipeline using improved interpretative structural modeling is carried out in the paper, comprehensively searching factors affecting CO_2 internal corrosion in gas gathering pipeline, analyzing of the relevance between factors affecting internal corrosion of pipeline, and identifying the logic relationship among the direct and indirect factors affecting internal corrosion of pipeline to lay a good foundation for the best corrosion control measures. And then the quantification of various factors affecting corrosion is done by combining with Analytical Hierarchy Process (AHP), to identify the relative importance of the factors affecting internal corrosion of gas gathering pipeline in quantitative way through comparison, which will provide more reasonable reference of quantitative decision making for the future pipeline corrosion control and integrity management.

Fuente: *Mechanic Automation and Control Engineering (MACE)*, July 2011, pages 3308 – 3311. Xuefen Zhao and Qin Liu. The School of Oil and Gas Engineering, Chongqing University of Science and Technology, China.

Leer completo en: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5987699

Sulfuro de hidrógeno y dióxido de carbono en tubería de gas. Corrosión: Mecanismo y Protección
H_2S and CO_2 are the most common and damaging two kinds of corrosive substances for natural gas pipeline, against increasingly serious corrosion problems of natural gas pipeline, the paper respectively had a study of H_2S or CO_2 corrosion of pipelines, then researched the interact of H_2S and CO_2 to pipeline corrosion mechanism. The ultimate goal is to put forward protection and pipeline life extension measures.

Fuente: *Automation and Control Engineering (MACE)*, July 2011, pages 333 – 336. Zhaoting Fan, Shentao Zhang, Zhixiang Dai, and Yu Hu. Engineering Faculty of Materials Science, Chongqing University, China.

Leer completo en: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5986926

El efecto de dos exudados óleo-resina de la goma de F*erula assa-foetida* y *Ammoniacum Dorema* sobre la corrosión de acero en un medio ácido dulce
A comparative study of two oleo-gum resins exudate from Ferula assa-foetida (*F. assa-foetida*) and Dorema ammoniacum (*D. ammoniacum*), as inhibitors for mild steel corrosion in 2 M HCl solution was investigated by weight loss measurements, potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) methods. Potentiodynamic polarization curves indicated that both oleo-gums behave as mixed type inhibitors. The effect of temperature on the inhibition efficiency was studied. At all temperatures, the experimental data fit Langmuir isotherm for both oleo-gum resin exudates. Quantum chemical calculations were performed to illustrate the adsorption process of some specific components of two oleo-gum resin exudates.

Fuente: *Corrosion Science*, vol. 53, issue 8, August 2011, pages 2489 – 2501. M. Behpoura, S.M. Ghoreishia, M. Khayatkashania, and N. Soltanib. Department of Analytical Chemistry, Faculty of Chemistry, University of Kashan, Islamic Republic of Iran, Department of Chemistry, Payame Noor University (PNU), Tehran 19395-4697, Islamic Republic of Iran.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0010938X11001879

Película porosa de polímero con capacidad de auto-regenerarse junto con un inhibidor de corrosión, insertados para la protección anticorrosiva
Porous polymer films with varying pore sizes were prepared by changing the evaporation time of an organic solvent. A specimen was prepared consisting of porous polymer film containing corrosion inhibitor coated onto carbon steel. The specimens were scratched with a knife-edge, and the polarization resistance was monitored in a sodium chloride solution. An increase in polarization resistance was confirmed, and the films with larger-sized pores demonstrated a higher self-healing capability.

Fuente: *Corrosion Science*, vol. 1, 19 August 2011, pages 01 – 06. M Behpour, S M Ghoreishi, M Khayatkashani, and N Soltani. Department of Analytical Chemistry, Faculty of Chemistry, University of Kashan, KashaDepartment of Chemistry, Payame Noor University (PNU), Tehran 19395-4697, Islamic.

Leer completo en: http://www.sciencedirect.com/science/article/pii/S0010938X11004355

PATENTES

Esta sección recopila patentes de diversas fuentes, mismas que son identificadas en cada caso. Los documentos referidos pueden ser de acceso restringido. Si alguno es de su interés, favor de contactar a:
→Act. Raúl Espinosa (55) 5623 3500 ext. 1455 / raul.espinosa@alianzafiidem.org

Materiales

Método y sistema de reproceso para ceniza volante de carbón para producir materiales cementantes
No de Publicación: WO/2011/084212
Inventores: Wilson, Bary Wallace(US) and Wilson, Brandon Ruf (US)
Compañía: Tensorcrete, Llc (US)

The invention provides a system and method of thermally processing high carbon coal fly ash to produce hydraulically reactive or pozzolanic supplemental cementitious material (SCM) and synthesis gas. In this "ash to energy and cement" (ATEC) process, coal fly ash and ancillary fuels are fed into a thermal reactor along with oxide materials, such as limestone. Carbon in the ancillary fuel and in the coal fly ash is converted to synthesis gas that is combusted to generate steam or electricity. The remaining low-carbon ash and bed material exits the thermal reactor chamber and is further processed at high temperature in a kiln or slagging unit to produce partially fused nodules or clinker. The nodules or clinker are cooled and ground to a desired fineness for use as a cementitious materials. The ATEC process effectively converts high carbon coal fly ash waste to energy and value added SCM.

Fuente: http://www.wipo.int/patentscope/search/en/detail.jsf?docId=WO2011084212&recNum=32&office=&queryString=ALL%3A%28concrete+and+fly+ash%29&prevFilter=&sortOption=Pub+Date+Desc&maxRec=2724

Pavimento material de revestimiento y método
No de Publicación: WO/2011/097287
Inventores: Reck, Nicholas(US)
Compañía: Tensar International Corporation(US)

A mix design for a polymer modified cement pavement overlay is disclosed along with a method of making and using the mix on a variety of pavement substrates. The mix includes a specific dry combination of: finely divided Elotex 2311 and 2322 or 2320 polymers; Type 2 or C144 aggregate or equivalent; Type I/II cement; Type F or Type C fly ash; intermediate length polymer microfibers; plasticizer; (optionally) calcium chloride or equivalent; (optionally) quikrete retarder or equivalent; and water. The mixture is combined and applied to the substrate in depths of about 1/8 to about 1 inch in lifts. The mixture is allowed to cure for 3-4 hours before being returned to traffic. The placed mixture exhibits preferred qualities of substrate adhesion, flexibility, tire friction, and wearability.

Fuente: http://www.wipo.int/patentscope/search/en/detail.jsf?docId=WO2011097287&recNum=18&office=&queryString=ALL%3A%28concrete+and+fly+ash%29&prevFilter=&sortOption=Pub+Date+Desc&maxRec=2724

Modificación química de la puzolana en planta de producción.
No de Publicación: WO/2011/103371
Inventores: Hansen, Andrew, S. (US) and Guynn, John M (US)
Compañía: Roman Cement, Llc (US)

Modified pozzolans and methods for making modified pozzolans that have desired chemical characteristics. The desired chemical characteristics are achieved by introducing one or more supplementary materials into the production plant that produces the pozzolans (e.g., usually as a waste material such as fly ash or slag). The supplementary material is incorporated into the pozzolan during its formation in the production plant and becomes an integral chemical constituent of the pozzolan. By forming the pozzolan with the desired characteristics in the production plant, the pozzolan can have optimal performance when blended with Portland cement for use in concrete.

Fuente: http://www.wipo.int/patentscope/search/en/detail.jsf?docId=WO2011103371&recNum=9&office=&queryString=ALL%3A%28concrete+and+fly+ash%29&prevFilter=&sortOption=Pub+Date+Desc&maxRec=2724

Energía

Cátodo y método para manufacturarlo
No de Publicación: WO 2011/089722
Inventores: MATSUSHITA, Yuki (JP); SATO, Takayasu (JP); and IMAMURA, Yuichiro (JP)
Compañía: Toyota Jidosha

Provided is a lithium secondary battery including a positive electrode mixture layer at a positive electrode, the positive electrode mixture layer containing a positive electrode active material and a conductive material. In a pore distribution curve measured by a mercury porosimeter, the positive electrode mixture layer has small and large two peaks of differential pore volume in the range of a pore diameter of 0.01 μm to 10 μm. The pore diameter at a small side peak (B) of the differential pore volume is configured to be smaller than the pore diameter at a large side peak (A) of the differential pore volume.

Fuente: http://www.wipo.int/patentscope/search/en/WO2011089722

Colector de corriente para una batería de flujo tipo redox
No de Publicación: WO 2011/088761
Inventores: QI, Minggang (CN)
Compañía: Xiangfan Dali Electrical Co., Ltd.

A current collector for an all-vanadium redox flow cell is compounded of a carbon fiber fabric and a conductive plastic (4). The warp carbon fiber bundles (1) and the weft carbon fiber bundles (2) of the carbon fiber fabric have a bulk resistivity not more than 2×10^{-3} $\Omega \cdot$ cm, a tensile strength not less than 2.5 Gpa and a tensile modulus not less than 220 Gpa. The carbon fiber fabric is provided with uniformly distributed holes. The bulk resistivity of the conductive plastic (4) is not more than 5×10^{-1} $\Omega \cdot$ cm. The carbon fiber fabric can be provided with 1 to 3 layers. The invention can realize large-area and large-scale production. The current collector has excellent conductivity, mechanical properties and corrosion resistance.

Fuente:http://www.wipo.int/patentscope/search/en/WO2011088761

Batería de flujo redox de alta densidad
No de Publicación: WO 2011/084649
Inventores: Chiang, Yet-Ming, (US); Carter, W., Craig, (US); Ho, Bryan, H.,(US); Duduta, Mihai, (US); and Limthongkul, Pimpa, (US)
Compañía: Massachusetts Institute Of Technology

Redox flow devices are described in which at least one of the positive electrode or negative electrode-active materials is a semi-solid or is a condensed ion-storing electroactive material, and in which at least one of the electrode-active materials is transported to and from an assembly at which the electrochemical reaction occurs, producing electrical energy. The electronic conductivity of the semi-solid is increased by the addition of conductive particles to suspensions and/or via the surface modification of the solid in semi-solids (e.g., by coating the solid with a more electron conductive coating material to increase the power of the device). High energy density and high power redox flow devices are disclosed. The redox flow devices described herein can also include one or more inventive design feature. In addition, inventive chemistries for use in redox flow devices are also described.

Fuente: http://www.wipo.int/patentscope/search/en/WO2011084649

Material compuesto por capas para su uso en baterías de flujo redox
No de Publicación: WO 2011/080334
Inventores: Öttinger, Oswin, (De); Schmitt, Rainer, (De); Bacher, Jürgen, (De); Mechen, Sylvia, (DE); and Hudler, Bastian, (De)
Compañía: Sgl Carbon Se

The invention relates to a layered composite material which is suitable, in particular, for use in a redox flow battery, comprising at least one layer of a textile fabric and at least one graphite-containing moulded body which is obtained by a method in which graphite particles are mixed with at least one solid organic additive to form a mixture and the thus obtained mixed is then compressed.

Fuente: http://www.wipo.int/patentscope/search/en/WO2011080334

Corrosión

Composiciones de un inhibidor de corrosión que contiene un aldehído y un tiol y/o una amina y métodos asociados
No de Publicación: No. US 7994099 B2
Inventores: Cassidy; Juanita M. (Duncan, OK), Kiser; Chad E. (Comanche, OK), Lane; Jim L.(Duncan, OK)
Compañía: Haliburton Energy Services, Inc. (Duncan, OK)

Provided herein are methods and compositions that include a method comprising contacting a metal surface with an acidic fluid comprising a corrosion inhibitor that comprises a reaction product formed from a direct or an indirect reaction of an aldehyde with a thiol and/or an amine functionalized ring structure. A composition provided includes an acidic treatment fluid that comprises an aqueous-base fluid, and acid, and a corrosion inhibitor that comprises a reaction product formed from a direct or an indirect reaction of an aldehyde with a thiol and/or an amine functionalized ring structure.

Fuente: http://ip.com/patent/US7994099

Inhibidores de corrosión que contienen surfactantes de amida para un fluido
No de Publicación: US 7989403 B2
Inventores: Acosta; Erick J.(Sugar Land, TX), Webber; Peter A.(Sugar Land, TX), Monk; Keith A. (League City, TX)
Compañía: Nalco Company (Naperville, IL)

A method of inhibiting corrosion in a fluid is disclosed. The method comprises: adding to the fluid an effective corrosion inhibiting amount of a synergist, a synergist when H_2S is present in the fluid, or no synergist when H_2S is present in the fluid, and a composition comprising specified following formula and optionally salts thereof.

Fuente: http://ip.com/patent/US7989403

Método para mantener ductos
No de Publicación: WO/2011/100016
Inventores: Huyse, Luc; (US); Van Roodselaar, Albert; (US).
Compañía: Chevron U.S.A. INC.

A method of maintaining a pipeline, including estimating a corrosion rate of a pipeline segment, is provided. The method includes analyzing a first data set obtained by inspecting the pipeline segment at a first time and a second data set obtained by inspecting the pipeline segment at a second time subsequent to the first time. A plurality of matched features that include a feature in the first data set and a feature in the second data set is identified. A confidence metric for each of the matched features is calculated. A subset of the matched features is selected based on the confidence metric, a size of the matched features, and/or a desired size of the subset. The corrosion rate of the pipeline segment is calculated based on changes in a geometric characteristic of features within the subset of the matched features between the first time and the second time.

Fuente: http://www.wipo.int/patentscope/search/es/detail.jsf;jsessionid=DD28AD8BB3B91487FA66A6B8C86BDCF9.wapp1?docId=WO2011100016&recNum=448&office=&queryString=&prevFilter=&sortOption=Fecha+de+publicaci%C3%B3n%2C+orden+descendente&maxRec=8018689

Materiales

2nd International Concrete Sustainability Conference
Noviembre 15 – 16, 2011
Doha, Qatar, State of Qatar

Más información:
http://www.sustainabilityconf.org

Future Concrete 2011
Diciembre 12 – 14, 2011
Dubái, Dubái, AE

Más información:
http://www.futureconcrete.com

6th Cement Trade & Technology, Conference & Expo
Febrero 7 – 8, 2012
Istanbul, ISTANBUL TR

Más información:
http://www.cementtrade.net

Energía

Electrical Energy Storage Applications And Technologies
Octubre 16 – 19, 2011
San Diego, California, USA

Más información:
http://www.sandia.gov/eesat

IEEE SmartGridComm
Octubre 17 – 20, 2011
Bruselas, Bélgica

Más información:
http://www.ieee-smartgridcomm.org

2011 Smart Energy International Conference
Octubre 24 – 26, 2011
San Francisco, California, USA

Más información:
http://www.smartenergyinternational.com

Renewable Energy Integration and Microgrids
Noviembre 7 – 10, 2011
Melbourne, Australia

Más información:
http://www.iecon2011.org

International Renewable Energy Storage Conference and Exhibition
Noviembre 28 – 30, 2011
Berlín, Alemania

Más información:
http://www.eurosolar.de

Corrosión

International Petroleum Technology Conference 2011
Noviembre 15 – 17, 2011
Bangkok, Tailandia

Más información:
http://www.iptcnet.org/2011

Oil and Gas Cyber Security Forum
Noviembre 21 – 22, 2011
Hotel Copthorne Tara, Londres, Reino Unido

Más información:
http://www.smi-online.co.uk/2011cyber-security21.asp

18th International Corrosion Congress
Noviembre 20 – 24, 2011
Perth, Australia

Más información:
http://www.18iccperth2011.com/

Optimising Enhanced Oil Recovery 2011
Marzo 25 – 26, 2012
Abu Dhabi, Emiratos Árabes

Más información:
http://www.wplgroup.com/aci/conferences/eu-eor2.asp

25th World Gas Conference
Junio 4 – 8, 2012
Kuala Lumpur, Malaysia.

Más información:
http://www.wgc2012.com