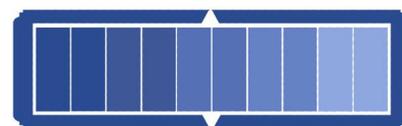


BOLETÍN DE VIGILANCIA TECNOLÓGICA E INTELIGENCIA COMPETITIVA

ALMACENAMIENTO DE ENERGÍA

MARZO - ABRIL 2020



BATTERYPLAT



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NOTICIAS

Energy-harvesting design aims to turn Wi-Fi signals into usable power

Publicada en <http://news.mit.edu/>, 27/04/2020.

Any device that sends out a Wi-Fi signal also emits terahertz waves —electromagnetic waves with a frequency somewhere between microwaves and infrared light. These high-frequency radiation waves, known as “T-rays,” are also produced by almost anything that registers a temperature, including our own bodies and the inanimate objects around us. Terahertz waves are pervasive in our daily lives, and if harnessed, their concentrated power could potentially serve as an alternate energy source.

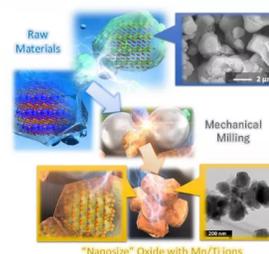


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Investigadores japoneses desarrollan un nuevo electrodo que abarata la batería y la dota de más autonomía

Publicada en <https://elperiodicodelaenergia.com>, 24/04/2020.

Un equipo de investigadores japoneses de la Universidad de Yokohama ha desarrollado un nuevo electrodo para las baterías de ion-litio que alimentan a los vehículos eléctricos que podría hacer que cuesten menos, doten a los coches de una mayor autonomía e incluso que duren más.



[ver más...](#)

Oak Ridge tests inductive bi-directional charging

Publicada en <https://www.electrive.com>, 23/04/2020.

Researchers at the US Department of Energy's Oak Ridge National Laboratory (ORNL) have successfully developed and deployed a bi-directional inductive charging system on a UPS PHEV delivery vehicle. Bidirectionality was not the only feature of the experiment.



[ver más...](#)

Scientists see energy gap modulations in a cuprate superconductor

Publicada en Eureka! technology & engineering, 01/04/2020.

(DOE/Brookhaven National Laboratory) Scientists studying high-T_c superconductors at the US Department of Energy's Brookhaven National Laboratory have definitive evidence for the existence of a state of matter known as a pair density wave -- first predicted by theorists some 50 years ago. Their results show that this phase coexists with superconductivity in a well-known bismuth-based copper-oxide superconductor.

[ver más...](#)

Semiconductors can behave like metals and even like superconductors

Publicada en Eurekalert technology & engineering, 17/03/2020.

(Swansea University) The crystal structure at the surface of semiconductor materials can make them behave like metals and even like superconductors, a joint Swansea/Rostock research team has shown. The discovery potentially opens the door to advances like more energy-efficient electronic devices.

[ver más...](#)

State of the Energy Market: Marrying Short-term Changes with Long-Term Strategy

Publicada en Environmental Leader, 17/03/2020.

With prices at a multi-year low, the volume of questions about the future is high. To understand the state of the market, ENGIE Impact experts will discuss the driving factors contributing to the lowest prices since 2016. The energy landscape is at an opportune time where your organization can strengthen ... [Read more »](#) The post State of the Energy Market: Marrying Short-term Changes with Long-Term Strategy appeared first on Environment + Energy Leader.

[ver más...](#)

Energy 'sector coupling' requires 75% more electricity, study says

Publicada en Euractiv - European Union Information Website (EU and Europe), 16/03/2020.

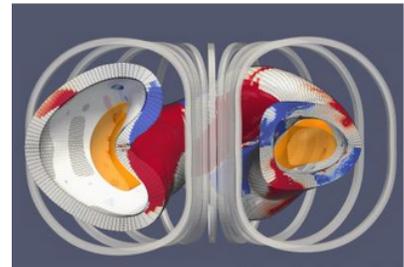
Direct and indirect electrification of transport, buildings and industry could deliver a 60% reduction in carbon emissions across Europe by 2050 – but that will require a massive upsurge in clean power output, according to BloombergNEF, a research company.

[ver más...](#)

Permanent magnets stronger than those on refrigerator could be a solution for delivering fusion energy

Publicada en Eurekalert technology & engineering, 11/03/2020.

(DOE/Princeton Plasma Physics Laboratory) Permanent magnets can, in principle, greatly simplify the design and production of the complex coils of stellarator fusion facilities.



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New York State Energy Storage Adoption Grows Faster than Expected

Publicada en Environmental Leader, 06/03/2020.

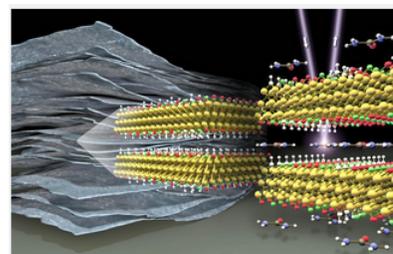
Energy storage deployments in New York have grown faster than anticipated since the state began a major push in 2018, the New York State Energy Research and Development Authority says. The post New York State Energy Storage Adoption Grows Faster than Expected appeared first on Environment + Energy Leader.

[ver más...](#)

Fast and furious: New class of 2D materials stores electrical energy

Publicada en EurekaAlert chemistry & physics, 03/03/2020.

(Helmholtz-Zentrum Berlin für Materialien und Energie) Like a battery, MXenes can store large amounts of electrical energy through electrochemical reactions- but unlike batteries, can be charged and discharged in a matter of seconds. In collaboration with Drexel University, a team at HZB showed that the intercalation of urea molecules between the MXene layers can increase the capacity of such 'pseudo-capacitors' by more than 50 percent. At BESSY II they have analysed how changes of the MXene surface chemistry after urea intercalation are responsible for this.

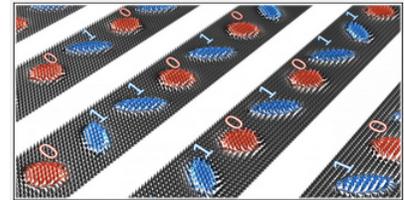


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Magnetic whirls in future data storage devices

Publicada en Eurekalert technology & engineering, 03/03/2020.

(Martin-Luther-Universität Halle-Wittenberg) Magnetic (anti)skyrmions are microscopically small whirls that are found in special classes of magnetic materials. They could be used to host digital data. A team of scientists from the Max Planck institutes (MPI) of Microstructure Physics in Halle and for Chemical Physics of Solids in Dresden and the Martin Luther University Halle-Wittenberg (MLU) has now made the observation that skyrmions and antiskyrmions can coexist bringing about the possibility to expand their capabilities in storage devices.



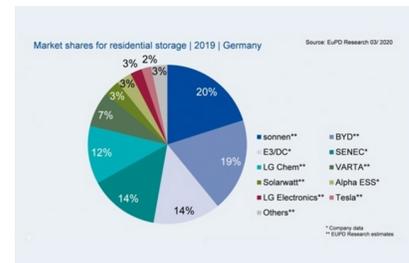
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EMPRESAS Y MERCADOS

About 200,000 Residential Battery Solutions Installed in Germany by the End of 2019 – sonnen and BYD are the Leading Suppliers

Publicada en <https://www.electrical-energy-storage.events>, 23/04/2020.

Bonn-based market researcher EUPD Research reports that 2019 was another record year for residential battery storage in Germany with around 65,000 new installations. As joint installations of solar PV systems with battery storage in Germany currently account for almost 90% of all installations, the PV market development is especially important for residential battery storage sales. Within a year more than 78,500 new PV systems were registered in the residential segment between 3 and 10 kW, a 41% increase of PV systems in this category compared to 2018.



[ver más...](#)

Ultracapacitor maker Skeleton Tech joins European project to ‘scavenge’ and ‘harvest’ energy

Publicada en <https://www.energy-storage.news>, 23/04/2020.

An innovation project in Europe to “harvest” energy that would otherwise be lost from various processes, involving a mixture of academic institutions and tech companies, has been joined by ultracapacitor maker Skeleton Tech. InComEss - (Innovative polymer-based composite systems for high-efficient energy scavenging and storage) was officially launched at the beginning of March by the European Commission with grant funding of around €7 million (US\$7.58 million), running until the end of August 2023.

[ver más...](#)

Capstone Turbine Partners with NYPA and Brenmiller Energy on Thermal Energy Storage Project

Publicada en <https://www.renewableenergymagazine.com>, 06/04/2020.

California-based Capstone Turbine Corporation, a leading clean technology manufacturer of microturbine energy systems, has partnered with the New York Power Authority (NYPA) and Brenmiller Energy on a groundbreaking thermal energy storage project for Purchase College, State University of New York (SUNY).

[ver más...](#)

BYD, Toyota Launch BYD TOYOTA EV TECHNOLOGY Joint Venture to Conduct Battery Electric Vehicle R&D

Publicada en <http://www.byd.com>, 02/04/2020.

Toyota City, Japan, April 2, 2020BYD Company Ltd. (BYD) and Toyota Motor Corporation (Toyota) announced today that preparations have proceeded since they signed an agreement for the establishment of a joint venture company to conduct research and development of battery electric vehicles (BEVs) on November 7, 2019, and registration of the new company has been completed. Operations are scheduled to commence in May 2020. The name of the new company is BYD TOYOTA EV TECHNOLOGY CO., LTD. (BTET). Hirohisa Kishi from Toyota will serve as chairman, and Zhao Binggen from BYD will be the chief executive officer (CEO).



[ver más...](#)

German storage factory swings into production

Publicada en <https://renews.biz>, 01/04/2020.

Tesvolt has begun production at Europe's first battery storage system gigafactory. The Wittenberg facility, in Germany, is manufacturing lithium-ion battery storage systems to meet growing demand for stationary energy. Tesvolt's factory manufactures battery storage systems in various size categories with storage capacities ranging from 9.6 kilowatt hour into the megawatt hour (MWh) category. The facility will be able to produce storage systems with a total capacity of up to 1MWh daily and 255MWh annually.



[ver más...](#)

Total to build France's largest battery

Publicada en Euractiv - European Union Information Website (EU and Europe), 17/03/2020.

Energy major Total has lifted the lid on a project that aims to construct the largest battery storage facility in France. It could help boost the growth of intermittent renewable power in the French energy mix. The 25 megawatt (MW) capacity battery power storage facility in Dunkirk, northern France, will be used to provide fast power reserve services to support the stability of the French electricity grid, the company said on Thursday (12 March).

[ver más...](#)

Marelli Invests In Transphorm To Develop GaN Power Electronics

Publicada en Inside EVS, 10/03/2020.

Marelli, one of the world's largest automotive suppliers (united Calsonic Kansei and Magneti Marelli), announced a strategic partnership with US-based Transphorm, which develops Gallium Nitride (GaN) technology for power electronics. The interest in Transphorm's GaN power modules is simple - vehicle electrification and related necessity to use efficient and reliable power electronics including power converters, on-board chargers and inverters.

[ver más...](#)

ZellkoBatt project to further German battery production

Publicada en Electrive, 05/03/2020.

The ZellkoBatt project starting this month has the goal of optimising large-format lithium-ion cells for automotive applications while reducing the costs of components and production processes. The project will be undertaken by the Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) in Germany. Project results are to be transferred to the ZSW's near-series research [...] The post ZellkoBatt project to further German battery production appeared first on [electrive.com](#).



[ver más...](#)

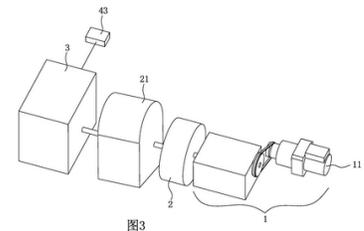
PATENTES

Mechanical power-utilization apparatus

Publicada en Tecnologías asociadas a almacenamiento de energía, 01/04/2020.

Solicitante: XIAMEN SHINHWA PATENT & TRADEMARK AGENCY CO., LTD

Provided is a mechanical power-utilization apparatus (10); a power system (1) receives electric power from a power supply terminal (A) and then drives a flywheel (2) to rotate, and the flywheel (2) can generate a large torque when rotating due to the principle of inertia; the flywheel (2) accepts a clutch system (21) for performing engage or release actions such that the clutch system (21) is linked to a power generation apparatus (3), using sufficient driving force to drive the power generation apparatus (3) to produce electric power; that is, a relatively small amount of electric power can be used to produce a relatively large torque so as to increase the amount of electric power generated, thus achieving the effect of energy conservation and power savings by the wattage of power originally expected to be used



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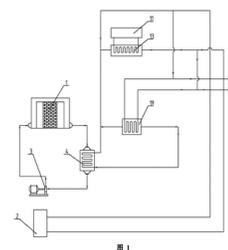
Solid heat-storing electric boiler heating and refrigerating system coupled with dynamic energy storage

Publicada en Tecnologías asociadas a almacenamiento de energía, 01/04/2020.

Solicitante: GLOBAL ENERGY INTERCONNECTION RESEARCH INSTITUTE CO., LTD.

A solid heat-storing electric boiler heating and refrigerating system coupled with dynamic energy storage, comprising: a dynamic energy storage device (2), a solid heat-storing electric boiler (1), a fan (3), an air-water heat exchanger (4), a water-water heat exchanger (19), and a refrigerating unit (13). The dynamic energy storage device (2) is configured to provide a first heat source for the refrigerating unit (13) to conduct refrigerating, or the dynamic energy storage device (2) is configured to provide the first heat source to conduct heating; the refrigerating unit (13) is configured to use the first heat source to conduct refrigerating; the fan (3) is configured to transfer the air to the solid heat-storing electric boiler (1) for heating after the air is pressurized

[ver más...](#)



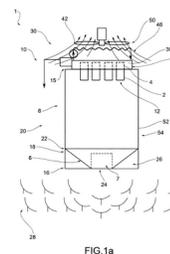
Thermal storage integrated with stirling motor

Publicada en Tecnologías asociadas a almacenamiento de energía, 01/04/2020.

SAIPEM S.P.A. [IT]

The present invention relates to a thermo-mechanical system (1) comprising: a driving unit (10) configured to transform thermal energy into mechanical energy by means of a working fluid expanding and contracting inside a closed circuit; said driving unit (10) comprising at least one hot cylinder (2) and at least one cold cylinder (4) accommodating the working fluid at different temperatures and fluidically connected by means of said closed circuit so that the pistons of said driving unit (10) are alternately movable in said cylinders (2,4) due to the different volume of said working fluid at the different temperatures

[ver más...](#)

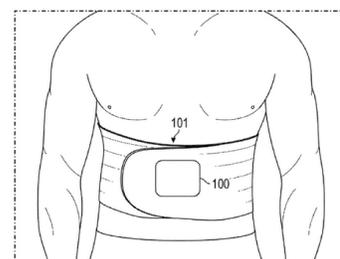


Continuous biomechanical energy harvester from breath-associated torso movement

Publicada en Tecnologías asociadas a almacenamiento de energía, 25/03/2020.

Solicitante: The Regents of the University of California

A system, device and method are provided for continuously generating more than 0.01 watt of electrical energy by harnessing mechanical or kinetic energy from a reciprocating motion of a users torso during breathing. The reciprocating motion causes reciprocating lateral and medial translation of two chambers of the device housing. That reciprocating lateral and medial translation rotates a gear, which in turn, drives a dynamo to produce electrical energy. Since the conversion from the mechanical energy of the spinning rod to power is direct, the energy-conversion efficiency may be up to 90% or higher. The device may further comprise one or more charging means for providing electrical energy to one or more peripheral electronic devices.



[ver más...](#)

Electric drilling rig/workover rig microgrid system based on flywheel energy storage technology

Publicada en Tecnologías asociadas a almacenamiento de energía, 25/03/2020.

Solicitante: BOMAY ELECTRIC INDUSTRIES CO., LTD. [CN/CN]

An electric drilling rig/workover rig microgrid system based on flywheel energy storage technology, comprising a power system (1), wherein the power system (1) is sequentially connected to a first converter (3) and a load system (7); the power system (1) and the first converter (3) are connected by means of an AC bus bar (2); the AC bus bar (2) is sequentially connected to a second converter (4) and a flywheel energy storage device (5). Also comprised is a micro-grid management system (6) connected to the flywheel energy storage device (5). By means of the present electric drilling rig/workover rig microgrid system based on flywheel energy storage technology, an electric drilling rig is subject to intelligent management, which allows the improvement of energy use efficiency and the smart grid system to become the development direction for power systems of electric drilling rigs, and solves the problems of high investment in fixed assets and low utilization of fuel oil caused by the technology for power grid management means of traditional electric drilling rigs falling behind.

[ver más...](#)

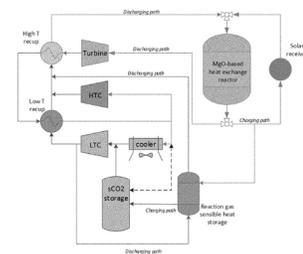
High temperature thermochemical energy storage system

Publicada en Tecnologías asociadas a almacenamiento de energía, 25/03/2020.

Solicitante: Southern Research Institute

A thermochemical energy storage system and method of storing thermal energy are described. The energy storing system described herein comprises a reactor comprising: a) a reactor with a CO₂ sorbent including MgO; and b) a supercritical CO₂ source with supercritical CO₂ and H₂O, wherein the supercritical CO₂ source is in fluid communication with the reactor and the CO₂ sorbent including MgO to allow flow of the supercritical CO₂ and H₂O between the supercritical CO₂ source and the reactor, thereby allowing contact of CO₂ with the CO₂ sorbent comprising MgO.

[ver más...](#)



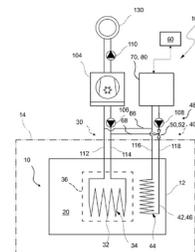
Latent heat accumulator system comprising a latent heat accumulator and method for operating a latent heat accumulator system

Publicada en Tecnologías asociadas a baterías, supercapacitadores, supercondensadores, acumuladores, 25/03/2020.

Solicitantes: VIESSMANN WERKE GMBH & CO. KGA

Latent heat storage system includes at least one latent heat storage device which contains a storage medium with latent heat, at least one extraction circuit by means of which, in accordance with the intended purpose, heat can be extracted from the storage medium, and at least one regeneration circuit by means of which, in accordance with the intended purpose, heat can be supplied into the storage medium. The at least one latent heat storage device includes at least one extraction heat exchanger which is in contact with the storage medium and can be connected to the extraction circuit, and at least one regeneration arrangement within the storage medium, which can be connected to the regeneration circuit.

[ver más...](#)

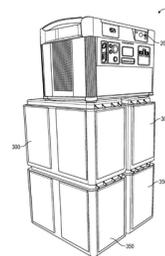


Link device for coupling energy storage devices having disparate chemistries

Publicada en Tecnologías asociadas a almacenamiento de energía, 25/03/2020.

Solicitante: Goal Zero LLC

An energy storage system includes a first energy storage device having a first energy storage chemistry, a second energy storage device having a second energy storage chemistry different than the first energy storage chemistry, and a link device. The link device is configured to facilitate electrically coupling the second energy storage device to the first energy storage device, regulate a first power profile of first power provided by the first energy storage device to the second energy storage device such that the first energy storage device can selectively charge the second energy storage device, and regulate a second power profile of second power provided by the second energy storage device to the first energy storage device such that the first energy storage device can selectively draw power from the second energy storage device to increase a power capacity thereof.



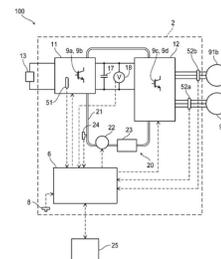
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Power converter for electric vehicle

Publicada en Tecnologías asociadas a baterías, supercapacitadores, supercondensadores, acumuladores, 25/03/2020.

Solicitante: TOYOTA JIDOSHA KABUSHIKI KAISHA:

A power converter for an electric vehicle that converts output of a battery to driving an electric traction motor is disclosed. The power converter may include: a power switching element; a current sensor provided on a bus bar in which an output current of the switching element flows; a cooler cooling the switching element; a temperature sensor measuring a temperature of a coolant; and a controller controlling the switching element. The controller may be configured to: estimate a temperature of the current sensor based on the temperature of the coolant



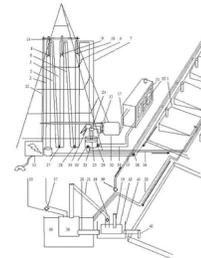
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Production of mechanical/electrical energy from heat energy with and by the use of buoyancy factor on evaporation or sublimation and condensation

Publicada en Tecnologías asociadas a almacenamiento de energía, 25/03/2020.

Solicitante: Sudarshan K.C.

There are various source of heat energy. Amongst the various sources Solar energy, waste heat form garbage, waste heat from transformers, waste heat from chemical reactions, waste heat from plant and machinery, heat from geo-thermal or the vast heat energy lying in the seas and oceans are some of the major ones which are free and unused. Apart from these, we can also produce heat energy from fuels like fossil fuels, hydrogen gas, forest products etc. A lot of heat energy is being wasted and though converted to mechanical or electric energy it is not that efficient. However, using the evaporation or sublimation and condensation process brought about through difference in temperature and the use of buoyancy factor to increase the efficiency of the energy production, the heat energy can be converted to mechanical or electrical energy in excess of hundred percent.



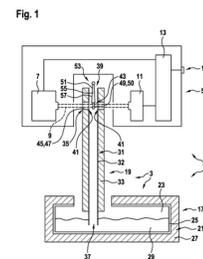
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Sample thickness measuring arrangement and method for measuring a thickness of a sample at cryogenic temperature by interferometry using a cryostat

Publicada en Tecnologías asociadas a almacenamiento de energía, 25/03/2020.

Solicitante: EUROPEAN MOLECULAR BIOLOGY LABORATORY

A sample thickness measuring arrangement (1) and method for measuring a thickness of a sample (49) are proposed. The sample thickness measuring arrangement (1) comprises a sample thickness measuring unit (5) for measuring the thickness of a sample (49) based on interferometry. Furthermore, it comprises a cryostat (3) comprising a coolant reservoir (17) and a sample observation unit (19) for observing characteristics of a sample (49). The sample observation unit comprises a tube (31) enclosing an observation volume (43), a thermal tube insulation layer (33) and a window arrangement (35). The tube is open at a distal end (37) and at a proximal end (39). The distal end of the tube is arranged within a storage volume (23) of the coolant reservoir. The tube has two lateral openings (41) in its tube walls at opposing sides with regards to the observation volume.



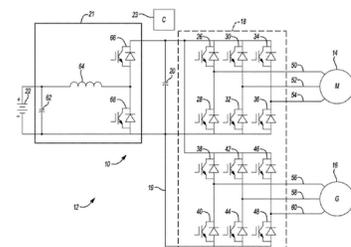
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Temperature based control of variable voltage converter

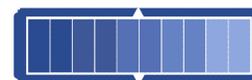
Publicada en Tecnologías asociadas a baterías, supercapacitores, supercondensadores, acumuladores, 25/03/2020.

Solicitante: Ford Global Technologies, LLC

A vehicle electric drive includes a controller programmed to operate a power converter to boost voltage from a battery for a DC bus and to limit voltage output from the power converter to a predefined maximum voltage value that varies with temperature of coolant used to cool the power converter.



[ver más...](#)

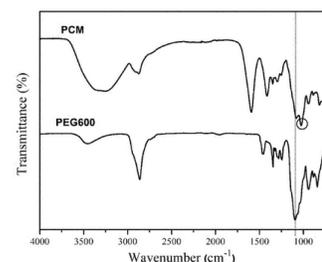


Thermal Conduction Enhanced Organic Composite Shape-stabilized Phase Change Material and Preparation Method Thereof

Publicada en Tecnologías asociadas a almacenamiento de energía, 25/03/2020.

Solicitante: DALIAN UNIVERSITY OF TECHNOLOGY

The present invention relates to the technical field of new materials, and relates to a thermal conduction enhanced organic composite shape-stabilized phase change material and a preparation method thereof. A thermal conduction enhanced organic composite shape-stabilized phase change material, which is composed of a coordination crosslinked network polymer, an organic solid-liquid phase change material and a thermal conduction enhancer, the mass percent are as follows: coordination crosslinked network polymer 1-50%, organic solid-liquid phase change material 40-98.9%, and thermal conduction enhancer 0.1-10%, the coordination crosslinked network polymer being formed by complexing of polymer compound with metal ions.



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Thermal Energy Storage Apparatus

Publicada en Tecnologías asociadas a almacenamiento de energía, 18/03/2020.

A thermal energy storage apparatus, including: a block of a heat-absorbing material, the block defining at least one receptacle and being a contiguous block of compressed sintered graphite; and a phase change material stored in the or each receptacle, the phase change material being one that expands as it cools, wherein separation of side walls of the or each receptacle progressively increases as they extend upwardly from the base, whereby as the phase change material solidifies and expands it is urged upwardly to reduce pressure applied to the heat-absorbing material.

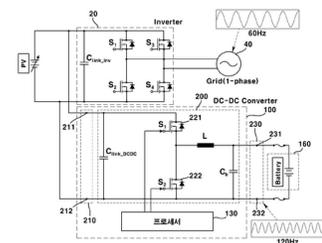
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DC-DC converter for solar linked energy storage system and control method thereof

Publicada en Tecnologías asociadas a almacenamiento de energía, 18/03/2020.

Solicitante: LG INNOTEK CO., LTD.

According to an embodiment, disclosed are a DC-DC converter for compensating for a ripple, in a solar linked energy storage system, and a control method thereof. In particular, disclosed is a DC-DC converter for compensating for a ripple generated in a DC link where a single phase inverter and a converter are connected. The DC-DC converter may obtain a frequency of a grid to compensate for the ripple.



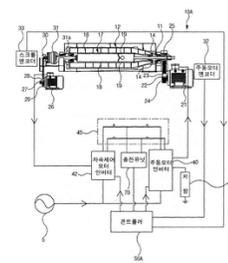
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Decanter-type centrifugal dehydrator capable of saving energy

Publicada en Tecnologías asociadas a consumo y reciclaje de energía, 18/03/2020.

Solicitante: ROYAL PRECISION INDUSTRY CO., LTD [KR]

A disclosed decanter-type centrifugal dehydrator comprises: a rotating bowl; a scroll; a main motor for providing power to rotate the bowl; a differential-speed control motor which provides power to control the rotation speed of the scroll and is a generator-combined motor for generating electric energy while its own shaft rotates without consuming electric energy; a gear box mechanically connected to the bowl, the differential-speed control motor, and the scroll so as to determine the rotation speed of the scroll according to the rotation speed of the bowl and the rotation speed of the shaft of the differential-speed control motor; and an electric power storage unit which comprises a super capacitor and is a unit for storing surplus electric energy and supplying the electric energy as necessary.



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Method for storing energy in the form of hydrazine carbonate

Publicada en Tecnologías asociadas a almacenamiento de energía, 18/03/2020.

Solicitante: Schaeffler Technologies AG & Co. KG

Energy storage is accomplished by producing hydrazine carbonate and later reconvertng the hydrazine carbonate to release the energy. Sea water is firstly used in an electrolysis process to prepare hypochlorite. The hypochlorite reacts as a result of introduction of ammonia to produce monochloramine and then hydrazine. The hydrazine reacts as a result of introduction of carbon dioxide to give hydrazine carbonate. To release the energy, the hydrazine carbonate liberates hydrogen or at least a hydrogen-containing gas by reaction over a noble metal-free catalyst. The hydrogen may then be enriched before being fed to a fuel cell.

[ver más...](#)

Power converter for transferring power

Publicada en Tecnologías asociadas a almacenamiento de energía, 18/03/2020.

Solicitante: ASSA ABLOY AB

It is presented a power converter for transferring electric power provided on an input terminal to an energy storage element. The power converter comprises: an inductor; a switch connected to selectively control a connection between the inductor and the input terminal; and a comparator, wherein an output of the comparator controls the switch, a first input of the comparator is supplied with a voltage being proportional to a voltage of the input terminal, and a second input of the comparator is supplied with a voltage being proportional to a current from the input terminal; wherein the energy storage element is connected to a point between the inductor and the switch.

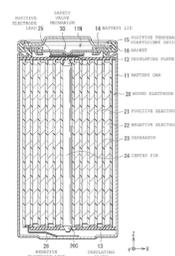
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Secondary battery, battery pack, electric vehicle, electric power storage system, electric power tool, and electronic apparatus

Publicada en Tecnologías asociadas a baterías, supercapacitadores, supercondensadores, acumuladores, 18/03/2020.

Solicitantes: MURATA MANUFACTURING CO., LTD.

A secondary battery includes a battery element including a positive electrode, a negative electrode, and an electrolytic solution, a housing member having an open end and configured to accommodate the battery element, and a safety valve mechanism attached to the housing member and configured to close the open end. The safety valve mechanism includes a closing member and a coupling member disposed between the battery element and the closing member. The coupling member is electrically coupled to both of a wound electrode body and the closing member, and has a coupling portion physically coupled to the closing member, and a groove is provided in at least part of a peripheral region of the coupling portion.



[ver más...](#)

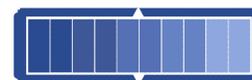
Thermosetting electrolyte composition for lithium secondary battery, gel polymer electrolyte prepared therefrom, and lithium secondary battery comprising same

Publicada en Tecnologías asociadas a baterías, supercapacitadores, supercondensadores, acumuladores, 18/03/2020.

Solicitante: LG CHEM, LTD.

The present invention relates to a thermosetting electrolyte composition for a lithium secondary battery, a gel polymer electrolyte prepared therefrom, and a lithium secondary battery comprising same and, specifically, to: a thermosetting electrolyte composition for a lithium secondary battery, comprising LiPF₆, which is a first lithium salt, a second lithium salt excluding LiPF₆, a nonaqueous organic solvent, and a polymer or an oligomer comprising a unit represented by chemical formula 1; a gel polymer electrolyte prepared therefrom; and a lithium secondary battery comprising same.

[ver más...](#)



Energy Storage Container And Heat Dissipation System For The Same

Publicada en Tecnologías asociadas a almacenamiento de energía, 11/03/2020.

An energy storage container and a heat dissipation system for the same are provided. The heat dissipation system for the energy storage container includes a container body, and a battery module assembly and multiple air conditioning modules both located in the container body. In a length direction or a width direction of the container body, each of two side ends of the battery module assembly is provided with at least one air conditioning module. The heat dissipation system further includes an air supply duct and an air return duct, a partition plate is arranged in the air supply duct, to divide the air supply duct into a first air supply duct and a second air supply duct which are mutually independent. The above arrangement avoids increasing a height of the energy storage container, thereby effectively facilitating the transportation and installation of the energy storage container.

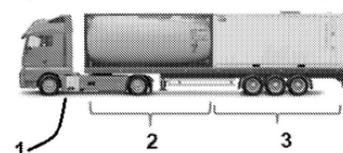
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Apparatus allowing cryogenic deep-freezing of food products during transport

Publicada en Tecnologías asociadas a almacenamiento de energía, 11/03/2020.

Solicitantes: L'AIR LIQUIDE, SOCIETE ANONYME POUR L'ETUDE ET L'EXPLOITATION DES PROCEDES GEORGES CLAUDE [FR/FR]

The invention relates to a method for refrigerated transport of products, in particular food products, from the production site thereof to a storage or consumption or sales location using a refrigerated transport vehicle (1) which comprises a refrigerated container (3) and which is provided with a refrigeration unit for mechanical cooling, comprising the following steps: • - before loading the products into the internal space of the container, performing a phase of cooling the internal space at a rapid rate by carrying out mechanical cooling or a direct injection of a cryogenic fluid into the internal space.



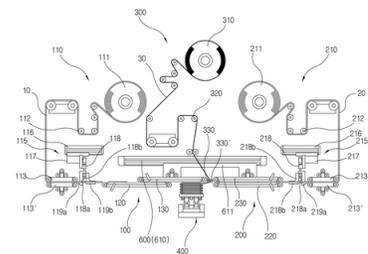
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Apparatus for manufacturing cell stack of secondary battery at high speed

Publicada en Tecnologías asociadas a baterías, supercapacitores, supercondensadores, acumuladores, 11/03/2020.

Solicitante: CHO, Gibong; KR

The present invention relates to an apparatus for manufacturing a cell of a secondary battery and, more particularly, to an apparatus for manufacturing a cell stack of a secondary battery at high speed, which: uses a vacuum belt conveyor as a device for alternately supplying a cathode plate and an anode plate to transfer electrodes by a simple reciprocating motion of a conveyor and a rotational motion of a belt, thereby enabling stacking of secondary battery cells at high speed



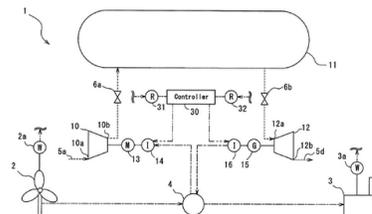
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Compressed air energy storage generator

Publicada en Tecnologías asociadas a almacenamiento de energía, 11/03/2020.

Solicitante: KABUSHIKI KAISHA KOBE SEIKO SHO (KOBE STEEL, LTD.)

A compressed air energy storage generator includes a motor, a compressor, a pressure accumulator, an expander, a generator, an electric-motor inverter, a generator inverter, a feed command receiver, a discharge command receiver, and a controller. The controller includes a feed determination unit, a discharge determination unit, and an input and output adjustment unit, the feed determination unit being configured to determine whether a feed command value is smaller than minimum charge power, the discharge determination unit being configured to determine whether a discharge command value is smaller than minimum discharge power



[ver más...](#)



Electronic device power supply method and apparatus, electronic device, and storage medium

Publicada en Tecnologías asociadas a baterías, supercondensadores, supercapacitores, acumuladores, 04/03/2020.

Solicitante: ZTE CORPORATION

The embodiments of the present disclosure provide an electronic device power supply method and apparatus, electronic device, and storage medium. The method comprises: obtaining a first battery life of a first battery and obtaining a second battery life of a second battery; according to said first battery life and said second battery life, determining a difference in service life between the first battery and the second battery; if the service life difference is greater than a service life difference threshold, then, of the first battery and the second battery, using the battery having a high service life to supply power.

[ver más...](#)

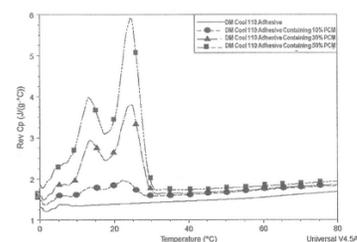
Hot melt adhesive containing phase changing materials

Publicada en Tecnologías asociadas a almacenamiento de energía, 04/03/2020.

Solicitante: HENKEL IP & HOLDING GMBH

Disclosed is a hot melt adhesive composition comprising a hot melt adhesive in combination with a phase change material. The phase change material provides thermal regulatory characteristics to the hot melt adhesive. Preferably the phase change material is a microencapsulated organic wax having a melting temperature of from 5 to 80° C and a latent heat of fusion of from 40 to 300 Joules/gram. The addition of the phase change material increases the storage modulus, viscosity and enthalpy of the hot melt adhesive composition while maintaining the adhesive strength of the hot melt adhesive. The phase change materials find use in any hot melt adhesive composition.

[ver más...](#)



Inductive chargeable energy storage device

Publicada en Tecnologías asociadas a almacenamiento de energía, 04/03/2020.

Solicitante: QI, Suxia

An inductive chargeable energy storage device comprises a positive spiral electrode; a negative spiral electrode; two separators interposed between the electrodes; and one or two diodes which electrically connect the positive and negative spiral electrodes therebetween. When the device is coupled to an inductive charging platform, at least one of the conductors of the spiral electrodes receives electric energy from the a primary or transmitter coil of the inductive charging platform and converts the electric energy back to a DC flowing through the device, so that the received electric energy is stored in the positive and negative spiral electrodes.

[ver más...](#)

Mounting frame, energy storage unit, variable pitch system, wind turbine generator and method

Publicada en Tecnologías asociadas a almacenamiento de energía, 04/03/2020.

Solicitante: BEIJING GOLDWIND SCIENCE & CREATION WINDPOWER EQUIPMENT CO., LTD.

Provided are a mounting frame (100), an energy storage unit (2), a variable pitch system, a wind turbine generator and method, wherein the mounting frame (100) is used for mounting accumulators (200) on a hub (1), comprising: a base (10), which has a pre-determined thickness, and has a mounting surface (11) in its own thickness direction (X)

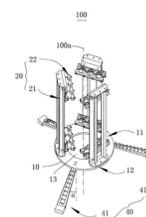


图 3

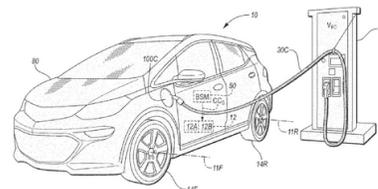
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Self-balancing switching control of dual-pack rechargeable energy storage system with series and parallel modes

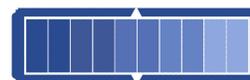
Publicada en Tecnologías asociadas a almacenamiento de energía, 04/03/2020.

Solicitante: GM Global Technology Operations LLC

An electrical system includes a rechargeable energy storage system (RESS) and a controller. The RESS includes first and second battery packs connected to a voltage bus, each pack having a respective plurality of battery cells and a corresponding cell balancing circuit. The RESS further includes switches that selectively connect or disconnect the packs to or from each other to achieve series and parallel modes. The controller executes a method by detecting a requested series to parallel mode transition. Responsive to a threshold imbalance being present in a state of charge or pack voltage of the packs relative to each other, the controller balances the state of charge/voltage using open/closed state control of the cell balancing circuits, and possibly a switching block having PWM-controlled switches and a circuit element. The controller may execute the requested mode transition upon balancing.



[ver más...](#)

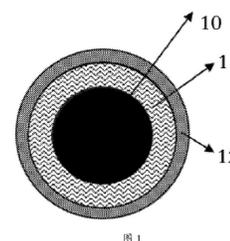


Silicon-based composite negative electrode material, preparation method therefor, and energy storage device

Publicada en Tecnologías asociadas a almacenamiento de energía, 04/03/2020.

Solicitante: HUAWEI TECHNOLOGIES CO., LTD

Provided in the embodiments of the present invention is a silicon-based composite negative electrode material, comprising a silicon-based material inner core and a coating layer covering the surface of the silicon-based material inner core, the coating layer comprising a first coating layer arranged on the surface of the silicon-based material inner core and a second coating layer arranged on the surface of the first coating layer, the first coating layer comprising a two-dimensional quinone aldehyde covalent organic framework material, and the second coating layer comprising a fast ion conducting material. The first coating layer has ultra-strong toughness and an ordered pore structure, being capable of effectively absorbing the stress produced by the expansion of the silicon-based material inner core and ensuring the integrity of the coating layer, and also has high electrical conductivity and ion conductivity, being capable of effectively enhancing the electron and ion conduction effects of the coating layer.



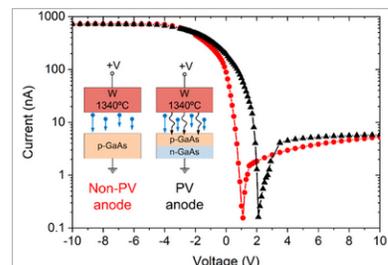
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Photovoltaic Anodes for Enhanced Thermionic Energy Conversion

Publicada en ACS Energy Letters, 06/04/2020.

ACS Energy Letters DOI: 10.1021/acsendergylett.0c00022 Thermionic energy converters are heat engines based on the direct emission of electrons from a hot cathode toward a colder anode. Because the thermionic emission is unavoidably accompanied by photonic emission, radiative energy transfer is a significant source of losses in these devices. In this Letter, we provide the experimental demonstration of a hybrid thermionic–photovoltaic device that is able to produce electricity not only from the electrons but also from the photons that are emitted by the cathode.



[ver más...](#)

Integrated high voltage generator with ATmega 328 microcontroller using flyback transformer

Publicada en AIP Scitation, 31/03/2020.

AIP Conference Proceedings, Volume 2221, Issue 1, March 2020. The method of increasing the output voltage at high voltage generator using two Fly-back Transformers (FBT) arranged in a series circuit integrated with AT-MEGA328 has been successfully created and tested. This method is done by doubling the output voltage by arranging two FBT in a series electrical circuit. Additionally, the ATMEGA328 microcontroller is integrated into this system to regulate the frequency and duty cycle in ideal conditions in the process so that the output voltage becomes more optimum. The test results show that this method has succeeded in increasing the output voltage by 93.91% by adjusting the frequency and duty cycle of this process at the values of 3000Hz and 60% respectively. The success of this research is very useful to be applied in various fields that require high voltage such as milk pasteurization system, dielectric for food, food sterilization, air purifier, and other applications.

[ver más...](#)

Theoretical analysis of electrode-dependent interfacial structures on hydrate-melt electrolytes

Publicada en AIP Scitation, 25/03/2020.

The Journal of Chemical Physics, Volume 152, Issue 12, March 2020. Aqueous electrolytes have the potential to overcome some of the safety issues associated with current Li-ion batteries intended for large-scale applications such as stationary use. We recently discovered a lithium-salt dihydrate melt, viz., $\text{Li}(\text{TFSI})_{0.7}(\text{BETI})_{0.3}\cdot 2\text{H}_2\text{O}$, which can provide a wide potential window of over 3 V; however, its reductive stability strongly depends on the electrode material. To understand the underlying mechanism, the interfacial structures on several electrodes (C, Al, and Pt) were investigated by conducting molecular dynamics simulation under the constraint of the electrode potential. The results showed that the high adsorption force on the surface of the metal electrodes is responsible for the increased water density, thus degrading the reductive stability of the electrolyte. Notably, the anion orientation on Pt at a low potential is unfavorable for the formation of a stable anion-derived solid electrolyte interphase, thus promoting hydrogen evolution. Hence, the interfacial structures that depend on the material and potential of the electrode mainly determine the reductive stability of hydrate-melt electrolytes.

[ver más...](#)

Solidification enhancement of phase change material implemented in latent heat thermal energy storage

Publicada en AIP Scitation, 25/03/2020.

AIP Conference Proceedings, Volume 2213, Issue 1, March 2020. The emphasis of this current study is to perform a numerical simulation of the solidification behaviour of phase change material for the latent heat thermal storage unit has shell and tube design in order to improve the thermal performance of the latent heat storage unit. A comparison has been carried out for the storage unit using two different alignment, essentially, horizontal and vertical for two configurations plane one (non-finned) and finned one. The outcome results were compared with the experimental results in order to validate the model. Moreover, the transit temperature profile was also presented in this study to get a better understanding for this particular process. The predicated results were shown a good agreement with experimental data that used. The results indicated that when fins is installed solidification process enhanced with an average percentage of 60% the effect of alignment during solidification process is insignificant for both cases of finned and plane LHSU. It is worth to mention that this study can be used to improve the understanding the thermal performance of the phase change material and to reduce the efforts of the experiential trails in the future investigations.

[ver más...](#)

Modeling of the aerodynamics of the integrated four blades (VAWT) having movable vanes

Publicada en AIP Scitation, 25/03/2020.

AIP Conference Proceedings, Volume 2213, Issue 1, March 2020. One of the economic problems facing all the public at present is the increasing demand for energy. Because of industrial development, fossil fuel depletion is on the increase, so the use of renewable energies as an alternative to fossil fuels has become apparent. In addition to solving problems caused by fossil fuels on the climate. Wind power is one of the most important renewable energies; the wind turbine is the machine that converts wind energy into mechanical energy. Which is used to pumping water, grind grain and generate electricity. The aim of this work is to study the aerodynamic performance by using Computational Fluid Dynamics (CFD) of a model of a vertical axis wind turbine, which has four integrated blades (each of which consisted of a vertical movable vane with Darius-type airfoil). The objective from combining the airfoil with the vanes comes to solve the low starting torque of the airfoil. The (SST) k- turbulence model and finite volume method were used with ANSYS FLUENT 16.1 software. The results concluded from the present numerical simulation give that the drag coefficient C_d is in maximum value at the positive side at 90° angular position, and C_d is decreased to the minimum value in the negative side at 45° angular position. The drop in the static pressure on the positive side is higher than on the negative side. The aerodynamics characteristics results represented by the static and dynamic pressures distributions and velocity distribution show that the air exerted to the turbine blade on the negative side is easily passes without any resistance. Therefore, it can be concluded that the addition of the vertical movable vanes with straight airfoil in one construction of a vertical wind turbine blade helps to solve the Darrieus straight airfoil starting torque and increases the rotation of the turbine rotor.

[ver más...](#)

Energy saving in Iraq: Waxes as phase change materials for space heating

Publicada en AIP Scitation, 25/03/2020.

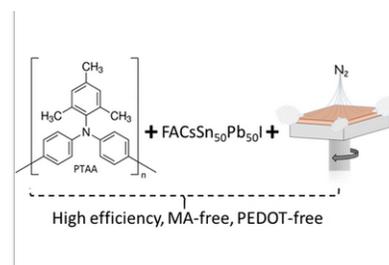
AIP Conference Proceedings, Volume 2213, Issue 1, March 2020. Space heating is one of air-conditioning sectors that consumes a huge amount of the electrical energy supplied to the house and has a major impact on emissions of greenhouse gases and corresponding global warming. Phase change materials (PCMs) are regarded as a possible solution for reducing the energy consumption of buildings by storing the heat and releasing it in certain times. The present study assists for the utilization of waxes as PCMs by attaching an enclosed space to the roof of the building where the wax is exposed to high solar intensity in order to melt, and then circulating the warm air to the room overnight for heating. Building considerations as well as thermo-physical properties of waxes have been taken and measured experimentally. Results have shown that these materials have a good potential for reducing energy demand and satisfy comfortable thermal conditions. The obtained results, from a rig model built for that purpose, showed that the indoor temperature with the using of waxes could increase by 3-6 oC at winter nights compared to that measured in a traditional one. Furthermore, a simulation program depended on degree-days method explained that the energy consumption could be saved up to 67%. In other words, waxes could submit encouraging suggestions to enhance the heating for energy efficient buildings and offer sustainable solutions.

[ver más...](#)

Improving Low-Bandgap Tin–Lead Perovskite Solar Cells via Contact Engineering and Gas Quench Processing

Publicada en ACS Energy Letters, 23/03/2020.

Low-bandgap Sn/Pb ABX₃ perovskites have reached photovoltaic power conversion efficiencies >20%, but they usually have poor stability due to the common use of acidic poly(3,4-ethylenedioxythiophene):polystyrenesulfonate (PEDOT:PSS) hole transport layers and A-site cation compositions containing methylammonium (MA). Here, we develop a process to enable high-quality MA-free Sn/Pb perovskite films grown using a gas quenching process instead of the conventional antisolvents, which provides improved control of the film growth and eliminates wrinkling.

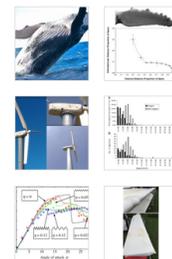


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Influence of leading-edge protuberances of fx63 airfoil for horizontal-axis wind turbine on power performance

Publicada en Sustainable Energy Technologies and Assessments, 21/03/2020.

Publication date: April 2020 Source: Sustainable Energy Technologies and Assessments, Volume 38 Author(s): Yan-Ting Lin, Pao-Hsiung Chiu. The humpback whale's pectoral fin has special leading-edge protuberances. This unique structure improves the performance of the pectoral fin. In this study, we employed this biological characteristic as the passive fluid control device on a 25 kW horizontal axis wind turbine. The wind turbine blades used in present study are based on FX63 with the rotating diameter of 12.4 m, the rated wind speed of 12 m/s and the rated speed of 60 rpm. By employing the dimensionless analysis, it shows that at 5 degree pitch angle, C_p and TSR can have 17.67% and 13.42% increments when the turbine blade was equipped with leading edge protuberances. Moreover, the output power variation can be reduced from 87.4% to 41.9% when ambient wind speed is 8 m/s.



[ver más...](#)

Ultrafast magnetism: The magneto-optical Kerr effect and conduction electrons

Publicada en AIP Scitation, 20/03/2020.

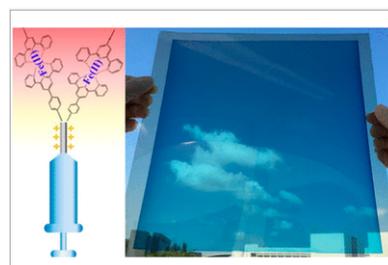
Applied Physics Letters, Volume 116, Issue 11, March 2020. Most experiments on ultrafast magnetodynamics have been conducted using the magneto-optical Kerr effect. Here, we compare the Kerr effect's magnetic sensitivity to the spin dynamics measured by photoemission. The magnetization dynamics on an Fe/W(110) thin film are probed by spin-resolved photoemission spectroscopy and the Kerr effect. The results reveal similarities between the spin dynamics at low binding energy and the response probed by the Kerr effect. Therefore, the Kerr effect probes states relevant for spin transport and spin flips but may not be sensitive to the entire magnetic moment in femtosecond spin dynamics experiments.

[ver más...](#)

Molecular Level Assembly for High-Performance Flexible Electrochromic Energy-Storage Devices

Publicada en ACS Energy Letters, 19/03/2020.

ACS Energy Letters DOI: 10.1021/acsenerylett.0c00245. The rational design and scalable assembly of nanoarchitectures are important to deliver highly uniform, functional films with high performance. However, fabrication of large-area and high-performance films is quite difficult because of the challenges in controlling homogeneous microstructures, interface properties, and the high cost of the conventional vacuum deposition technique.

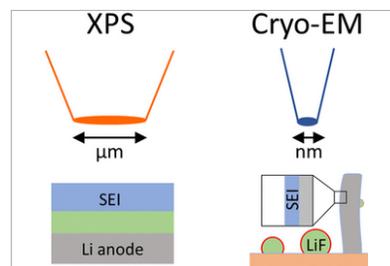


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Resolving Nanoscopic and Mesoscopic Heterogeneity of Fluorinated Species in Battery Solid-Electrolyte Interphases by Cryogenic Electron Microscopy

Publicada en ACS Energy Letters, 18/03/2020.

The stability of lithium batteries is tied to the physicochemical properties of the solid-electrolyte interphase (SEI). Owing to the difficulty in characterizing this sensitive interphase, the nanoscale distribution of SEI components is poorly understood. Here, we use cryogenic scanning transmission electron microscopy (cryo-STEM) to map the spatial distribution of SEI components across the metallic Li anode.



[ver más...](#)

Recovery kinetics in high temperature annealed AlN heteroepitaxial films

Publicada en AIP Scitation, 16/03/2020.

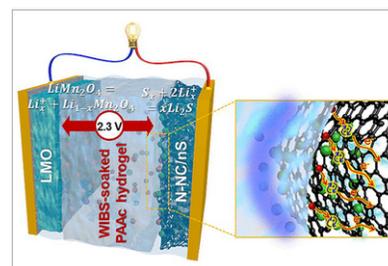
Journal of Applied Physics, Volume 127, Issue 11, March 2020. Based on the experimental dislocation annihilation rates, vacancy core diffusion-controlled dislocation climb was found as a dominant recovery mechanism in high temperature annealing of AlN heteroepitaxial films. Dislocation annihilation mechanisms via dislocation glide (with or without kinks) and vacancy bulk diffusion were found to be less significant. Cross-slip was also ruled out as a possible mechanism as a majority of dislocations in heteroepitaxial AlN films are threading edge dislocations. While dislocation climb through both vacancy bulk and core diffusion could offer a plausible explanation of the recovery process, the activation energy for the vacancy core diffusion-controlled dislocation climb was relatively low ($4.3 \pm 0.1 \text{ eV}$), as estimated from an Arrhenius plot. The validity of the vacancy core diffusion mechanism was also supported by a large vacancy mean free path (240nm), which was comparable to the sample thickness and thus the average dislocation length. Finally, the experimentally observed dislocation density reduction as a function of the annealing temperature and time was in good agreement with the vacancy core diffusion mechanism.

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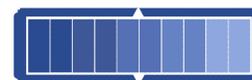
Facile Multivalent Redox Chemistries in Water-in-Bisalt Hydrogel Electrolytes for Hybrid Energy Storage Full Cells

Publicada en ACS Energy Letters, 13/03/2020.

High-capacity electrode materials have been investigated to overcome the low energy density of electrochemical capacitors, but there are still issues arising from the trade-off between charge storage capacity and kinetics, efficiency, and stability. Herein, we describe multivalent sulfur redox chemistry for the high power and energy efficiency of hybrid energy storage full cells, where nitrogen-incorporated nanoporous carbon/nanosulfur (N-NC/nS) and lithium manganese oxide are configured into negative and positive electrodes, respectively, using water-in-bisalt (WIBS)-soaked poly(acrylic acid) hydrogel electrolyte.



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Effect of encapsulation and additives doping on the thermophysical properties of erythritol for thermal energy storage

Publicada en AIP Scitation, 11/03/2020.

Journal of Renewable and Sustainable Energy, Volume 12, Issue 2, March 2020. We wished to improve the thermophysical properties and thermal stability of meso-erythritol (ET) for storage of thermal energy. Hence, capsules containing ET with polysiloxane (pSiO) shells were fabricated using ultraviolet-assisted in situ polymerization, and the effects of encapsulation and additives doping on the thermophysical properties of ET were studied. Differential scanning calorimetry showed that the heat-release performance of the composite (pSiO-C-A@ET) upon addition of 3.0wt. % carboxymethylcellulose (CMC) and 9.0wt. % nano--Al₂O₃ increased significantly from 64.1% to 89.0%, and the supercooling degree decreased dramatically from 89.5°C to 17.0°C, compared with that of pure ET. Spectroscopy (Fourier transform-infrared, x-ray diffraction) implied no change in the crystal structure of ET after encapsulation by pSiO shells. Addition of a nucleation agent (nano--Al₂O₃) and thickening agent (CMC) had no effect on the crystal structure of pSiO-C-A@ET. The thermal conductivity of pSiO@ET and pSiO-C-A@ET capsules increased by 6.2% and 20.0% compared with that of pure ET (0.65 W/m·K) at 25°C, respectively. The thermal conductivity was enhanced noticeably by doping with nano--Al₂O₃. Results from accelerated thermal cycling suggested that pSiO@ET and pSiO-C-A@ET capsules exhibited good thermal stability and thermal durability. These data suggest that composite phase-change materials could be employed for applications involving storage of thermal energy.

[ver más...](#)

Thermally modulated hydrogenation in Fe_xPd_{1-x} alloy films: Temperature-driven peculiar variation of magnetism

Publicada en AIP Scitation, 10/03/2020.

Applied Physics Letters, Volume 116, Issue 10, March 2020. The sensitive hydrogen effect on spintronic materials has been recently demonstrated to have high application potential. However, the correlation between hydrogen pressure (P), temperature, and magnetic properties still remains unclear. In this study, the magnetic moment of Fe in an Fe–Pd alloy thin film was increased through hydrogen absorption, as evidenced by the enhanced x-ray magnetic circular dichroism signal of Fe. Hydrogen absorption and desorption hysteresis loops in the magnetic coercivity H_c - P diagram revealed that most hydrogen was absorbed when P was above 10 mbar and desorbed when P was approximately 10–6 mbar. The hydrogenation effect on the magnetism of an Fe–Pd alloy film was eliminated at an annealing temperature of 360K without considerable hydrogen desorption. The annealing-driven cyclic enhancement of H_c was demonstrated because of the competition between thermal activation and H bonding. These results clearly reveal the critical temperature dependence and provide applicable knowledge of the hydrogenation effect on magnetic Pd-alloys.

[ver más...](#)

Method for conducting in situ high-temperature digital image correlation with simultaneous synchrotron measurements under thermomechanical conditions

Publicada en AIP Scitation, 04/03/2020.

Review of Scientific Instruments, Volume 91, Issue 3, March 2020. This work presents a novel method of obtaining in situ strain measurements at high temperature by simultaneous digital image correlation (DIC), which provides the total strain on the specimen surface, and synchrotron x-ray diffraction (XRD), which provides lattice strains of crystalline materials. DIC at high temperature requires specialized techniques to overcome the effects of increased blackbody radiation that would otherwise overexpose the images.

[ver más...](#)

Perspective on State-of-Health Determination in Lithium-Ion Batteries

Publicada en <https://asmedigitalcollection.asme.org>, 04/03/2020.

State-of-health (SOH) is an essential parameter for the proper functioning of large battery packs. A wide array of methodologies has been proposed in the literature to track state of health, but they often lack the proper validation that needed to be universally adaptable to large deployed systems. This is likely induced by the lack of knowledge bridge between scientists, who understand batteries, and engineers, who understand controls. In this work, we will attempt to bridge this gap by providing definitions, concepts, and tools to apply necessary material science knowledge to advanced battery management systems (BMS). We will address SOH determination and prediction, as well as BMS implementation and validation using the mechanistic framework developed around electrochemical voltage spectroscopies. Particular focus will be set on the onset and the prediction of the second stage of accelerating capacity loss that is commonly observed in commercial lithium-ion batteries.

[ver más...](#)

Improved gyrator–capacitor model considering eddy current and excess losses based on loss separation method

Publicada en AIP Scitation, 03/03/2020.

AIP Advances, Volume 10, Issue 3, March 2020. The traditional equivalent circuit model based on the reluctance–resistance analogy method is used to model electromagnetic equipment in power systems. However, this model has unreasonable analogy, incomplete magnetic circuit information, and is difficult to expand. This study proposes an improved gyrator–capacitor (G–C) model and its parameter extraction method for the modeling of electromagnetic devices in power systems. An improved G–C model considering eddy current and excess losses is proposed on the basis of the loss separation method and by utilizing the physical concept of resistance. On the basis of the proposed model, simple calculation methods of the instantaneous loss power and density of the core are presented. A parameter extraction method considering the fitting effect of the entire hysteresis loop and special points is proposed in accordance with the idea of curve fitting. The proposed model and its parameter extraction method are verified by comparing the calculated results with the measured results.

[ver más...](#)

Simulation study of the effects of phase separation on hydroxide solvation and transport in anion exchange membranes

Publicada en AIP Scitation, 02/03/2020.

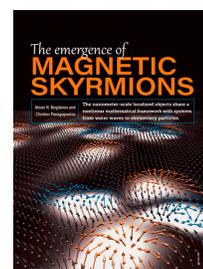
The Journal of Chemical Physics, Volume 152, Issue 9, March 2020. Anion exchange membranes (AEMs) can be cheaper alternatives than proton exchange membranes, but a key challenge for AEMs is to archive good ionic conductivity while maintaining mechanical strength. Diblock copolymers containing a mechanically strong hydrophobic block and an ion-conducting hydrophilic block have been shown to be viable solutions to this challenge. Using our recently developed reactive hydroxide model, we investigate the effects of block size on the hydroxide solvation and transport in a diblock copolymer (PPO-b-PVBTMA) in its highly hydrated state. Typically, both hydroxide and water diffusion constants decrease as the hydrophobic PPO block size increases. However, phase separation takes place above a certain mole ratio of hydrophobic PPO to hydrophilic PVBTMA blocks and we found it to effectively recover the diffusion constants. Extensive analyses reveal that morphological changes modulate the local environment for hydroxide and water transport and contribute to that recovery. The activation energy barriers for hydroxide and water diffusion show abrupt jumps at the same block ratios when such recovery effects begin to appear, suggesting transformation of the structure of water channels. Taking the advantages of partial phase separation can help optimize both ionic conductivity and mechanical strength of fuel cell membranes.

[ver más...](#)

The emergence of magnetic skyrmions

Publicada en AIP Scitation, 01/03/2020.

Physics Today, Volume 73, Issue 3, Page 44-49, March 2020. The nanometer-scale localized objects share a nonlinear mathematical framework with systems from water waves to elementary particles.



[ver más...](#)

Battery Lifetime Prognostics

Publicada en <https://www.sciencedirect.com>, 01/03/2020.

The increasing energy demands of a growing population and the challenges of climate change provide a strong driving force for transportation electrification and smart grid development. As one of the most widely used energy storage devices, lithium-ion batteries play an important role in those fields. One of the most urgent issues in lithium-ion batteries is degradation. Automakers have set 15 years in service as the goal for hybrid and electric vehicles. Storage batteries used in renewable energy systems and smart grids also require long lives.

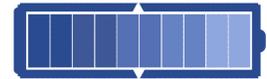
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Closed-loop optimization of fast-charging protocols for batteries with machine learning

Publicada en <https://www.nature.com>, 01/03/2020.

Simultaneously optimizing many design parameters in time-consuming experiments causes bottlenecks in a broad range of scientific and engineering disciplines. One such example is process and control optimization for lithium-ion batteries during materials selection, cell manufacturing and operation. A typical objective is to maximize battery lifetime; however, conducting even a single experiment to evaluate lifetime can take months to years.

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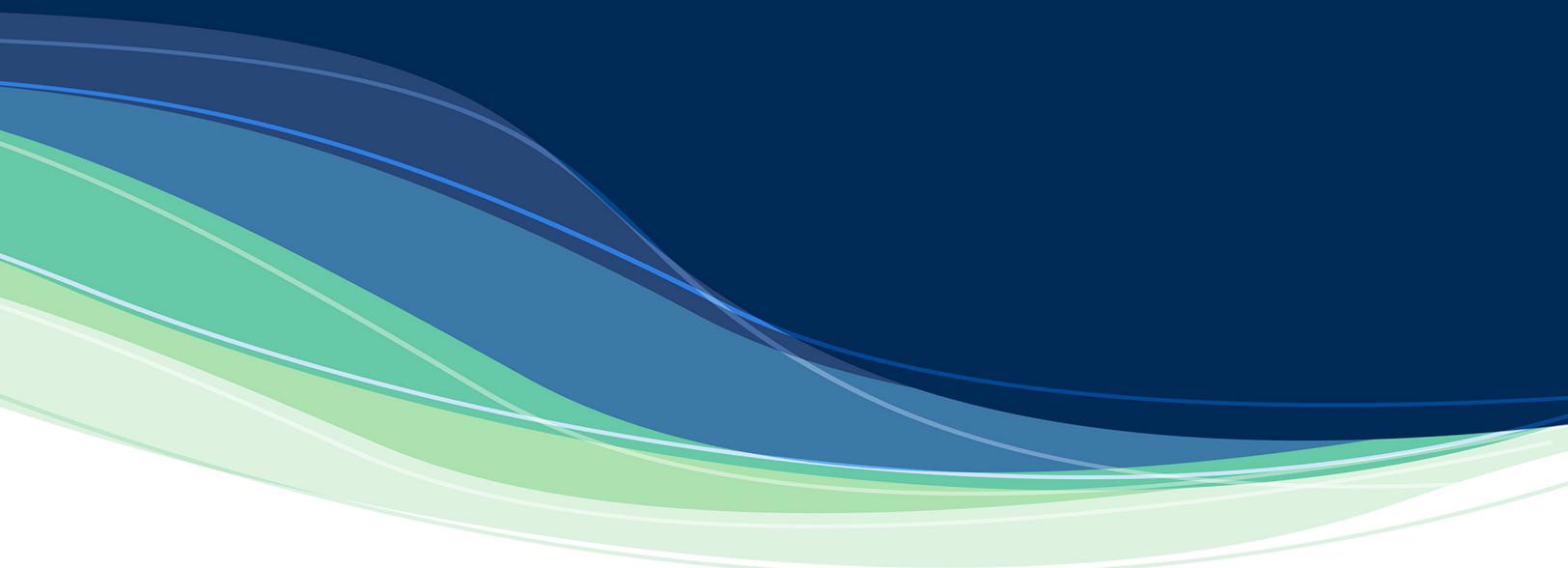


Lithium-ion battery fast charging: A review

Publicada en <https://www.sciencedirect.com>, 01/03/2020.

In the recent years, lithium-ion batteries have become the battery technology of choice for portable devices, electric vehicles and grid storage. While increasing numbers of car manufacturers are introducing electrified models into their offering, range anxiety and the length of time required to recharge the batteries are still a common concern. The high currents needed to accelerate the charging process have been known to reduce energy efficiency and cause accelerated capacity and power fade. Fast charging is a multiscale problem, therefore insights from atomic to system level are required to understand and improve fast charging performance.

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