A WEEKLY INFORMATION LETTER

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NEWSLETTER

Srinivas Institute of Technology, Department of Nano Technology,

Engineering (B.E.) in Nano Technology, Mangalore, Karnataka, India.

NANO PRODUCTS

Materia Truck Catalyst

The product is from the company Daihatsu, Japan. Using nanotechnology, the intelligent catalyst incorporates metallic ions of palladium, the most heat-sensitive of the metals used in a catalytic converter. The nano material used is the palladium nano particles which are used as catalysts in green chemistry.

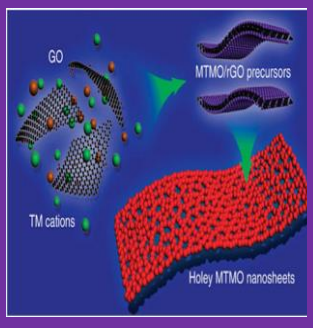
Nano auto verzegelingsset

The product is from the Air Shape Best Protect Nanotechnology Company from Netherlands. Nano auto verzegelingsset Rain and snow do not longer a bad sight! The glass remains far cleaner. This product is used in exterior accessories and also in water crafts. Nano materials are suspended in a liquid medium.

ADVANCEMENTS IN NANO TECHNOLOGY

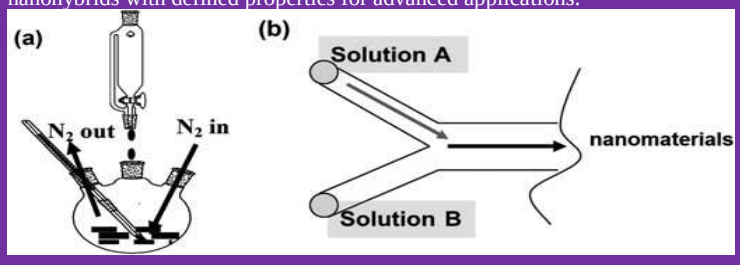
Holey two-dimensional nanosheets for efficient energy storage

Two-dimensional (2D) nanocrystals offer exciting opportunities for both fundamental studies and many technological applications due to their unique and fascinating properties. Transition metal oxide (TMO) nanomaterials have been widely studied as electrodes for alkali-ion storage, because they generally exhibit improved capacity and rate capability compared with their bulk counterparts due to the abundant active sites and the shortened ion diffusion distance. However it is critically challenging to synthesize TMO nanosheets with confined thickness as they are intrinsically non-layered materials that can't be exfoliated to form nanosheets as conventional layered materials do. Most TMOs are intrinsically non-layered materials, which cannot be mechanically or chemically exfoliated to form 2D nanostructures via the conventional exfoliation method. Therefore, a general and facile bottom-up strategy for the controlled synthesis of 2D TMO nanostructures is needed. In new work, researchers developed a general synthesis strategy by employing graphene oxide as a sacrificial template to prepare various 2D holey TMO nanosheets, including mixed metal oxides and simple metal oxides. The most exciting results of our research are that we develop a general sacrificial-template strategy for controlled synthesis of holey TMO nanosheets with tunable pore sizes for improved alkali-ion storage properties. This approach is universal for the synthesis of various 2D holey TMO nanosheets including mixed transition-metal oxides and simple oxides. This unique holey structure can minimize the restacking of 2D nanosheets and provide more active sites for alkali-ion storage. The researchers show that 2D holey TMO nanosheets composed of chemically interconnected metal oxide nanoparticles inherit the strong mechanical properties from graphene oxide, maintaining the holey morphology and displaying minimal structural changes during the lithiation processes.



Overview of synthesizing hybrid nanomaterials with microfluidics

Hybrid nanomaterials (nanohybrids) are composed of two or more components – at least one of which is nanoscale – exhibiting many distinct physicochemical properties and hold great promise for applications in optics, electronics, magnetics, new energy, environment protection, and biomedical engineering. Different types of nanohybrids have been successfully synthesized via microfluidic processes or hybrid microfluidic-batch processes. The synthesis of nanohybrids using microfluidic-based processes can fulfill many challenges present in conventional bottle batch methods. In a recent study researchers looks at the features of the current types of microfluidic devices in the synthesis of different types of nanohybrids based on the classification of the four main kinds of materials: metal, nonmetal inorganic, polymer and composites. In their review, the authors only illustrate some typical kinds of nanohybrids and the widely used nanohybrids – metal-organic frameworks (MOFs) – synthesized in microfluidic systems. Below is a summary of their article and their conclusions. The regulation of the kinetic parameters in each stage of nanohybrid formation can be realized along microfluidic channels. In the process, the integration of multiple microfluidic systems plays an important role in the optimization of the microstructures and properties of the nanohybrids. Coupling of microfluidic systems with some special analysis devices aids online microstructure and performance observation or detection during the nanohybrid formation. Moreover, the sequential synthesis and automation of the microfluidics during the entire procedure can provide a general low-cost and scale-out approach in the composition- component- and microstructure-controlled synthesis of nanohybrids with defined properties for advanced applications.



Cell generator: Harvesting energy from cells for micro biomedical applications

Recently, great progress has been made in the development of bio-hybrid devices with enhanced biological, mechanical and electrical designs. Several muscular tissue based actuators have been described and devices with cultured heart cells have also been reported to produce electrical outputs. The researchers integrated piezoelectric material with 3D-engineered living constructs for energy harvesting and electricity generation. The device was essentially based on an array of piezoelectric cantilevers, which was deformed by the spontaneous contraction of cardiac muscle cells, thus transducing mechanical vibration into electrical energy. The whole cantilever design was particularly customized to match the tiny force generated by cardiac micro-tissues, so that the device was sufficiently sensitive to pick up microscale disturbances by the contraction-relaxation of multicellular cardiac tissues. From a practical perspective, the researchers demonstrated a feasible strategy to converge small piezoelectric signals to functional outputs.In practice, the cell-based device was very suitable for the low-power-consuming applications on the micro-scale biomedical robotic device. As the authors demonstrated in this study, the "Cell Generator" was used to stimulate cultured neuronal network. With further development, this neural stimulating device could to be integrated into implantable neural stimulation devices, such as cochlear implants. Also, micro-machines based this design could potentially be used as a power-free and self-sustainable robot to perform diagnostic or therapeutic tasks in human body. The integration of active elements from biological systems, such as cells and tissues, with mechanical or electronic interfaces presents unique opportunities for creating bio-hybrid machines that are adapted to respond to complex stimuli for a range of engineering applications.