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NEWSLETTER

Srinivas Institute of Technology, Department of Nano Technology,

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

NANO PRODUCTS

Nano Silver Photocatalyst

The product is from Shenzhen Become Industry & Trade Co., Ltd., China. Nano silver photocatalyst keeps the features of common air sanitizer. Because of adding nanometer Ag, etc. the air sanitizer has capabilities of stronger oxidation reductive reaction, sterilization, deodorization, decomposing and adsorption, but also has the efficiency of persisting in sterilization (Can sterilize even in the conditions of no light) and keeping moisture within 24 hours. The solid suspended silver nano particle plays antimicrobial protection.

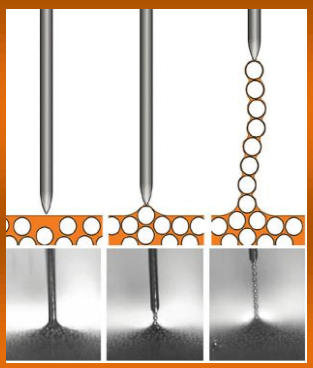
Alpha SanoProtex

Product of AkzoNobel Deco GmbH company from Germany, Alpha SanoProtex Based on silver ions, when combined with appropriate cleaning practices, the interior emulsion can contribute to lower infection rates for the MRSA bacteria, as well as contributing to effective infection prevention programs. The silver nanoparticles, suspended in a liquid medium, acts mainly as antimicrobial protection.

ADVANCEMENTS IN NANO TECHNOLOGY

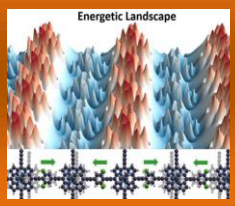
International team solves mystery of colloidal chains

A team of researchers demonstrated something that looked almost like magic. When they poked a needle-shaped electrode into a mixture of micron-sized, spherical metal particles dispersed in silicone oil, a sphere stuck to its end. As the electrode is pulled out of the dispersion, another sphere attached to the first sphere, and then another to the second sphere, and so on, until a long chain formed. The spheres behaved like magnetic beads, except no magnetism was involved. The particles have no tendency to cluster. Researchers realized that something more complicated was happening. Researchers understand the phenomenon that caused these chains to form. Their resulting discovery could lead to a new generation of electronic devices and a fast, simple method to write two-dimensional electronic circuits. Researchers performed multiple calculations, showing how the electrode's electric field changed the particles' properties. When the electrode is dipped into the colloidal solution, its charged tip polarizes each sphere. These induced dipolar interactions cause the spheres to link together. A resulting chain could contain hundreds of thousands of spheres, reaching up to 30 centimeters in length. After the team solved the mystery of how the chains formed, it had a second mystery to tackle. Another fascinating part is that once they pulled the chain out of the liquid, then no longer had to apply an electric field to hold the chain's structure. After the field was turned off, the stable particle chain remained stable. Following months of investigation, teams discovered that the chains maintained their structures due to liquid "bridges" between adjacent particles. As researchers pulled the chain out of the liquid, silicone oil clung to the sides of each particle, forming a case around the entire chain and keeping it intact. Surface tension plays a big role here. The liquid bridge made the particles stick together. The physics here is really interesting.



Electrostatic design of materials-a fundamentally new approach

Computational materials design is traditionally used to improve and further develop already existing materials. Simulations grant a deep insight into the quantum mechanical effects which determine material properties. Researchers use computer simulations to propose an entirely new concept for controlling the electronic properties of materials. Potentially disturbing influences arising from the regular arrangement of polar elements, so-called collective electrostatic effects, are used by the research group to intentionally manipulate material properties. The basic approach of the electrostatic design concept is to modify the electronic states of semiconductors via the periodic arrangement of dipolar groups. In this way they are able to locally manipulate energy levels in a controlled way. In doing so, they do not try to find ways to bypass such effects which are inevitable especially at interfaces. Rather, they make deliberate use of them for our own purposes. The first step was the electrostatic design of molecular monolayers, for example on gold electrodes. Experiments have shown that the predicted energy shifts within the layers actually take place and that charge transport through monolayers can be deliberately modulated. Also, the electronic states of 2D materials, such as graphene, can be controlled by means of collective electrostatic effects. For the example of 3D covalent organic networks, researchers show how - by means of collective electrostatic effects - the energy landscape within three-dimensional bulk material can be manipulated such that spatially confined pathways for electrons and holes can be realised. In this way charge carriers can, for instance, be separated and the electronic properties of the material can be designed as desired. The concept is especially interesting for solar cells. In classical organic solar cells, chemically different building blocks, so-called donors and acceptors, are used to separate the photogenerated electron-hole pairs. In the approach proposed here, the necessary local shift of energy levels occurs due to the periodic arrangement of polar groups. The semiconducting areas onto which the electrons and holes are shifted are chemically identical.



What ultimately limits the scaling of graphene nanogap electrodes?

The ability to create nanometer-sized gaps in sp2-bonded carbon materials offers a means of contacting nanoscale objects, for example, nanocrystals and single molecules, that cannot be achieved with conventional metallic electrodes.Scientists have found that the intense electric fields generated by applying a bias voltage across a nanometer-size graphene gap result in the spontaneous rearrangement of atoms and bonds that lead to reversible switching of the resistance. In new work, researchers investigate the scaling limits imposed by this switching behavior in the context of phase change memory (PCM) devices. However, their findings carry equal significance for all applications based on graphene nanogaps, including single-molecule electronics and graphene-based genome sequencing. The team finds that it is the intrinsic switching behavior of the graphene electrodes, rather than the properties of the phase change material, that ultimately limits the device scaling and therefore its performance. Researcher's observations indicate resistance switching in graphene nanogaps, which we attribute to the controlled formation and breakdown of carbon filaments. Analyzing the switching behavior, we find that the formation of carbon filaments is electric field dependent and only occurs in sub-5 nm gaps. These experiments demonstrate for the first time, reversible resistance switching in graphene nanogaps in ambient conditions. For PCM devices with electrode separations less than 5 nm, the scientists find the resistance switching to be fully dominated by the formation of carbon filaments. They point out that whereas the actual mechanisms that we propose (carbon filamentation) need further unambiguous proof, none the less our results point toward a key scaling limit to using such electrodes.