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NEWSLETTER

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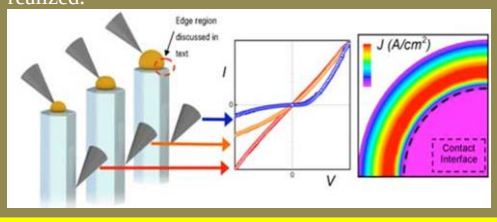
ADVANCEMENTS IN NANO TECHNOLOGY

Combining catalytic and electrical contact edge-effects to engineer the transport properties of nanocontacts to nanowires

Researchers have recently shown that the electrical transport of nanocatalyst contacts on nanowires can be controlled by varying the size of the metal particle in relation to the nanowire diameter, due to quantum-mechanical tunneling at the contact edge. Researchers developed a new experimental process (eSTEM) to directly correlate atomic-resolution electron microscopy to transport measurements on single Au-nanowire interfaces. eSTEM allowed the researchers to confirm the earlier result by adding or removing material to the tunneling channel at the interface edge that enhances or removes the tunneling path and to reveal a simple method for controlling the electrical transport properties of the nanocontacts. Atomically resolved evidence of a strong metal-support interaction (SMSI) at the Au-ZnO interface edge creating Ohmic transport behavior is studied by the researchers. Detailed atomic-resolution examination of Au-nanowire interfaces at SuperSTEM has shown that the ZnO nanowires and Au particles have interfaces that are structurally and chemically abrupt with high crystallographic quality. This feature ensures that the metal catalyst nanocontacts exhibit a dual effect at the interface edge. Firstly, accelerated chemical reactions take place at the edge region where the catalytic activity is greatest and secondly, tunneling current is concentrated in the same region creating transport properties that are very surface sensitive. There is a natural cross over between catalysts and electrical contact because the behavior of both can be heavily influenced by the surface properties of the material at the edge of the interface between the particle and support. These works show that by combining the catalytic effect of metal nanoparticles with quantum-transport effects when designing electrical contacts for nanomaterials real advances to next generation technologies can be realized.

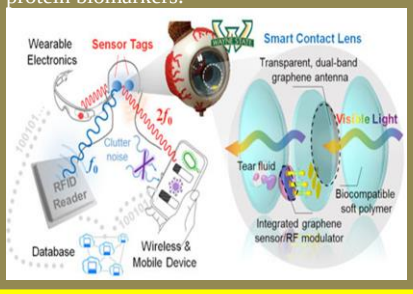


New 'printone' tool allows users to create 3-D printed wind instruments in any shape or form

A research team has developed a new interactive design tool called "Printone," which provides users with the ability to create functional 3-D printed wind instruments in any shape or form using interactive sound simulation feedback. The team designed 16 free-form wind instruments to play different melodies, including: a star that can play "Twinkle, Twinkle, Little Star," a bunny that can play "Little Peter Rabbit;" a snowman that can play "Jingle Bells;" and a dragon that can play "Puff the Magic Dragon." With Printone, everybody can be a designer of new wind musical instruments. You can transform almost any shapes you like into instruments and play your favorite melody. A wind instrument's sound is created by the player blowing air into the instrument, which creates a vibration of air known as the acoustic resonance- the interaction between sound waves and the internal geometries of the instrument. To date, most traditional wind instruments have taken on tube-like shapes for which the resonance is well understood, as creating free-form instruments manually has long been considered a challenge. Through Printone, users can make a wind instrument out of any shape and are able to select the target notes that they want the instrument to have. After the user inputs a three-dimensional shape into the platform, the tool creates a hollow acoustic cavity. The user then selects the area where they will blow into the instrument easily (known as "the fipple") and chooses the position and size of finger holes. The scale of the object can also be changed to hit the target range of notes. During this process, users are guided by quick feedback from the simulation on how each edit shifts the notes produced. Alternatively, users can utilize Printone's AutoTune feature, which produces hole sizes automatically for the target notes desired for the instrument.

Graphene-based smart contact lens works as self-powered biosensor

The latest example for application of graphene is a graphene-based wireless sensor that could make 24-hour healthcare easier to achieve by enabling wireless monitoring of various biomedical events in order to gain a more comprehensive assessment of the wearer's healthcare status. This novel device, which detects chemical/molecular agents and lengths of exposure, can be used as lightweight and transparent wearable or bio-implantable electronic sensor. It may provide an inexpensive way to detect in real-time the biomedical of interest. In this work researchers have demonstrated that graphene field-effect transistors (GFETs) can offer simultaneous radio-frequency modulation, chemical sensing and memory effects in a single component. The team's multifunctional nanosensor-modulator combines (RF) frequency modulation, sensing, and an analog memory effect to record the history of various chemical events, even with a single graphene transistor. This is, however, not possible with conventional solid-state electronic devices. This new frequency-modulated sensing paradigm may enable the development of practical graphene-based nanosensors with wireless connectivity for the continuous monitoring of surface chemical events. The back-gated graphene device demonstrates a distinct conversion of a radio signal's frequency, when introduced to reducing or oxidizing chemical gases, or to more complex substances, such as protein biomarkers.



NANO PRODUCTS

Hair Power Nano-Tech Solutions Shampoo

This product is from ALFAPARF Milano, Italy. Nano-Technology: advanced hair cosmetic solutions with nanospheres. The 1st treatment line with nanospheres designed to prevent and solve scalp problems such as dandruff, seborrhoea and thinning hair. Hair Power nanospheres with vitamins: nanometric carriers (one milion of millimetre) that function at the cellular level to deliver deep, potent vitamin power while helping to regenerate cells and rebalance the scalp's physical properties.

Hot Ice Thermal Patch™

This product is from company LifeWave, LLC, USA. This is a Health and Fitness product. The new Hot Ice Thermal Patch™ from LifeWave is a unique nanotechnology product in which some of the nanoparticles are used. The function of nanomaterial is to enhance the properties of material such as hardness and strength.

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