3rd International Conference and Expo on Graphene, Advanced 2D Materials & Semiconductors (CSE) A

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3rd International Conference and Expo on Graphene, Advanced 2D Materials & Semiconductors

About

Graphene 2019 This International summit gathers professionals from all over the world, invariable of age to discuss the current-state-of-art in this blooming field of graphene, advanced 2D materials, and semiconductors. A knowledge gathering initiative which provides diversified topics of discussion and insights in unraveling the wonders in the interdisciplinary arena of Materials Science and Nanotechnology. The 3rd International Conference and Expo on Graphene, Advanced 2D Materials & Semiconductors holds a theme of “A New Way to Atomic Assembly” which also paves way for young researchers in acquiring knowledge and information by meeting the experts. **Target Audience:** Graphene Chemistry Eminent Scientists. Biodegradable Graphene Professors. Physics Junior/Senior Research Fellows. Chemical Engineering Research Professors. Directors of Graphene Companies. Graphene and Material Science Engineers. Graphene, Material Science Associations and Societies.

Sessions/ Tracks Track 1: Graphene and other 2D materials Graphene was the first 2D material to be isolated. Graphene and other two-dimensional materials have a long list of unique properties that have made it a hot topic for intense scientific research and the development of technological applications. These also have huge potential in their own right or in combination with Graphene. The extraordinary physical properties of Graphene and other 2D materials have the potential to both enhance existing technologies and also create a range of new applications.

Pure Graphene has an exceptionally wide range of mechanical, thermal and electrical properties. Graphene can also greatly improve the thermal conductivity of a material improving heat dissipation. In applications which require very high electrical conductivity Graphene can either be used by itself or as an additive to other materials. Even in very low concentrations Graphene can greatly enhance the ability of electrical charge to flow in a material. Graphene's ability to store electrical energy at very high densities is exceptional. This attribute, added to its ability to rapidly charge and discharge, makes it suitable for energy storage applications.

Track 2: Advanced 2D Materials Two dimensional materials, often termed as single layered crystalline materials consists of single layer of atoms. An appreciable research is going on about 2D materials due to their outstanding properties. The advanced 2D materials of interest are graphene, graphyne, borophene, germanene, silicene, phosphorene, bismuthine etc. Among the carbon allotropes, graphene is one of the most versatile members and has been extensively studied. Graphene is in a state i.e., in between and called as a semi metal. In graphene, electrons/holes behave as massless Dirac Fermion because of the linear energy dispersion, thus mobility is found to be high. graphene has high optical transparency from near IR to near UV hence it can replace indium tin oxide in transparent conducting electrodes.

Track 3: Emerging Trends in graphene research The present generation with faster and smaller electronics is the result of advancements in the research. Now-a-days research on graphene is a hot topic owing to its unique and excellent properties. Graphene can be produced from mechanical exfoliation, chemical vapor deposition, plasma enhanced chemical vapor deposition, electrochemical synthesis and molecular beam epitaxy so on methods. Electrolysis of graphene is generally carried out to get graphene with high purity. In electronics graphene is used to make electrodes for touch screens, transparent memory chips, integrated circuits with graphene transistors. The main energy related areas which depend on graphene are solar cells, supercapacitors, lithium-ion batteries, and catalysis for fuel cells.

Track 4: Graphene Synthesis Synthesis of Graphene refers to any process for fabricating Graphene. Mechanical exfoliation is probably the technique to attain single and few layered Graphene produces from natural graphite by repeated peeling/exfoliation. Chemical vapour deposition has techniques for making thin continuous films with thickness control in micro-electronics. Plasma enhanced chemical vapour deposition synthesizing large area Graphene on copper foils using spin coated PMMA films. Graphene heterostructures are synthesized on cobalt substrates by using the molecular beam epitaxial growth.

Track 5: Large scale Graphene production and characterization Epitaxial growth of Graphene obtained on a 6H oriented SiC by vacuum heating at and limited the size of Sic substrates. Micro chemical exfoliation of highly oriented pyrolytic graphite which cannot be scaled to wafer-size dimensions. X-ray diffraction of high temperature annealed Ni film. Diffraction spectra were collected on the annealed Ni substrates over which Graphene films are typically synthesized. Graphene that is simply composed of the dissolution of glucose and in water, vaporization of water and calcination.

Track 6: Semiconductor materials and Nanostructures By alloying multiple compounds, some semiconductor materials are tunable that results in ternary, quaternary compositions.

Applications of semiconductors materials are optoelectronic, solar cells, Nano photonics, and quantum optics. Fabrication of cellulose Nano-structures via Nano Synthesis is a direct conversion of TMSC layers into cellulose via a Nano-sized focused electron beam as used in scanning electron microscopes.

Track 7: Graphene modification and functionalization Chemical functionalization of Graphene enables the material to be processed by solvent assisted techniques, such as layer by layer assembly, spin coating and filtration. Hexagonal boron nitride is electrical insulating, combined with Graphene and other 2D materials to make heterostructure devices. The two dimensional Graphene sheet structures for field emission of electrons due to the carrier mobility and electron mass. The filed emitter by using multi layered Graphene nanostructure, the graphitic structure of pristine Graphene and carbon nanotube is the driving force of their interaction .The combination of Graphene with carbon nanotubes to produced hybrids increased electrical conductivity, mechanical properties and high surface area.

Track 8: Applications of graphene in Energy and Biomedicals Graphene-enchaned lithium ion batteries could be used in higher energy usage applications now in smartphones, laptops and tablet PCs. Graphene has a great potential to use for low cost, flexible and highly efficient photovolatics devices due to its excellent electron-transport properties and carrier mobility. Single or few layered Graphene with less agglomeration, exhibit a higher effective surface area and better supercapictor. In hydrogen storage, hydrogen plays an important role in energy carriers. As a fuel of choice it is light weight, contains high energy density and emits no-harmful chemical by-products, hydrogen considered as a green energy. Graphene oxide has excellent characteristics as a nanomaterial for drug delivery. It expands for anticancer drugs to another non-cancer treatment diseases treatment. Using the fluorescence super-quenching ability of graphene to develop novel fluorescence resonance energy transfer biosensors. Cancer therapy made on exploration of graphene in drug delivery by in vitro test. For clinical cancer and other disease treatment, vivo behaviour of graphene loaded with drugs.

Track 9: Novel Hybrid carbon materials Large molecular building blocks for hybrid materials, such as large inorganic clusters, may be of the nanometre length scale. The term hybrid material is more often used if the inorganic units are formed in situ by molecular precursors, for example applying sol–gel reactions. The biggest distinction between a Nano composite and a hybrid is that a hybrid material possesses a property that does not exist in either of the parent components. Graphene and single-walled carbon nanotubes are carbon materials that exhibit excellent electrical conductivities and large specific surface areas. An effective, economic way of using carbon fiber is to combine it with a resin and another material, either a fiber or a metal, to produce a hybrid structure.

Track 10: Carbon nanotubes and Graphene Graphenated Carbon Nanotubes are new hybrid that combines graphitic foliates grown with sidewalls of bamboo style CNTs. It has high surface are with 3D framework of CNTs coupled with high edge density of Graphene. Chemical modification of carbon nanotubes are covalent and non-covalent modifications due to their hydrophobic nature and improve adhesion to a bulk polymer through chemical attachment. Applications of the carbon nanotubes are composite fibre, cranks, baseball bats, Microscope probes, tissue engineering, energy storage, super capacitor etc. Nanotubes are categorized as single-walled and multi-walled nanotubes with related structures.

Track 11: Electrochemistry of diamond and Nano carbon materials Carbon is an extraordinary element because of its ability to covalently bond with different orbital hybridizations. This leads to a rich variety of molecular structures that constitute the field of organic chemistry. For millennia, there were only two known substances of pure carbon atoms: graphite and diamond. The discovery of nanometre dimensional C60, and related fullerene-structures (C70, C84), spawned the field of Nano carbon research. The next major advance in carbon research was the discovery of carbon nanotubes (CNTs).The traditional electrochemical applications for carbon in solid electrode structures for the chlor-alkali industry as well in aluminium refining are giving way to more diverse applications requiring high-surface-area carbon i.e., capacitor, fuel cells, metal/air batteries and high-energy lithium batteries. In these of these applications carbon has the desirable combination of acceptable electrical conductivity, chemical/electrochemical compatibility to the surrounding environment, and availability in the appropriate structure for fabrication into electrodes. In addition, the low cost of carbon relative to other electronic conductors is an important advantage for its widespread use in electrodes, particularly in electrochemical systems that must compete with existing technologies. Diamond electrodes are particularly attractive for electrochemistry Because of its extraordinary chemical stability; diamond is a perspective electrode material to be used in electrochemistry and electrochemical engineering.

Track 12: Carbon Materials in Energy Carbon materials touch every aspect of our daily life in some way. Regarding todays environmental challenges carbon may be the key elemental component, usually blended into notations such as “carbon cycle” or “carbon footprint”. Interestingly, not being used as “fossil fuel”, carbon materials also considerably contribute to the field of sustainable energy. They are central in most electrochemical energy-related applications, i.e. they also help to generate, store, transport, and save energy. Nanostructured carbon is already used in fuel cells, conventional batteries and super capacitors. Electric double layer capacitors (EDLC, also called super capacitors) are energy storage devices based on the electrical adsorption of ions at the electrode/electrolyte interface (non-Faradaic process). Porous carbons are being used widely as electrode materials for super capacitors because of their high specific surface area and relatively good electrical conductivity.

Track 13: Nano Carbon Materials Nano carbons are among the most promising materials developed last years. Nano carbon materials include fullerenes, carbon nanotubes (CNT), carbon nanofibers (CNF), nanodiamond, onions and various hybrid forms and 3D structures based on these. Nano carbon materials such as carbon nanotubes (CNT's) and Graphene have many extraordinary properties, such as a factor of 1000 times higher mobility and 10 times larger saturation velocity than Si. Several years ago these materials were available in milligram-scale quantities. Now many of them are produced by tones per year.

Track 14: Applications of carbon nanotubes Carbon nanotubes (CNTs) are cylinders of one or more layers of Graphene (lattice). Diameters of single-walled carbon nanotubes (SWNTs) and multi-walled carbon nanotubes (MWNTs) are typically 0.8 to 2 nm and 5 to 20 nm, respectively, although MWNT diameters can exceed 100 nm. CNT lengths range from less than 100 nm to 0.5 m. Individual CNT walls can be metallic or semiconducting depending on the orientation of the lattice with respect to the tube axis, which is called chirality. carbon nanotube production exceeded several thousand tons per year, used for applications in energy storage, automotive parts, boat hulls, sporting goods, water filters, thin-film electronics, coatings, actuators and electromagnetic shields, health care and environmental protection.

Track 15: Synthetic Graphite and Natural Graphite Natural Graphite is a mineral which consists of graphitic carbon. It works as an excellent conductor of both heat and electricity. It is soft in nature and stable over a wide range of temperatures, whereas Synthetic graphite is a man-made substance manufactured by the high temperature processing of amorphous carbon materials. These graphites are having renowned applications. In nuclear engineering, a neutron moderator is a medium that controls the speed of neutrons. Solid graphite of nearly 20% is used in these moderators. Graphite paints are used in foundry molds, and graphite lubricants are used in forging dies. Graphite crucibles are used in foundry to hold molten metals. In integrated steel plants right from melting to the product graphite plays an important role as reducing agent, fuel, refractory, lubricant for dies etc... In the construction of batteries like lithium-ion batteries, lithium carbonate batteries, and nickel metal hydride batteries etc.

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