

# SUBR Patents



Inventor(s)	Department	Invention Title	Invention Abstract	Date Filed	Patent No.
Guang-Lin Zhao, Feng Gao, Zhou Wang	Physics	Carbon Nanotube Synthesis	Methods of making carbon nanostructures are disclosed with including examples having heat treatment of a mixture having a fibrous organic reagent and a catalyst in the presence of a reducing agent for a time sufficient to produce a quantity of carbon nanostructures which may be nanotubes or other related structures. The reducing agent may be hydrogen, nitrogen or ammonia.	5/19/2016	9,944,528
Jin Tong Wang	Physics	Gasifier	Gasifiers are disclosed that include multiple chambers, multiple microwave sources and multiple arc plasma torches. Such gasifiers may be configured to have a drain, an exhaust port and a path of fluid communication between the exhaust port and the drain. Under appropriate conditions, the gasifiers may eliminate undesired waste while at the same time delivering a significant net energy benefit to the operator of the gasifier.	2/2/2017	10,059,894
Yaser Banadaki, Safuru Sharifi, Jonathan Dowling	Computer Science	Electrically Controllable and Tunable Electromagnetic-Field Absorber/Emitter using Graphene/2D Material Multilayer Nanostructures	An electrically controllable and tunable electromagnetic-field absorber/thermal emitter is invented using graphene/two-dimensional materials based multilayer nanostructures that have the absorption efficiency of unity at mid-infrared wavelengths. Alternating layers of graphene and hexagonal boron nitride are deposited between support materials and grown on a substrate. Tungsten may be used as the substrate, and silicon carbide as the support material; or, silicon may be used as the substrate and tungsten disulfide as the support material depending on the operating frequencies and ambient temperature. The invention demonstrates a selectable, tunable and switchable electromagnetic-field absorption or thermal emission by changing a DC bias that alters the chemical potential of the graphene layers and thereby the optical response of the multilayer nanostructures.	12/14/2019	11,121,279
Guang-Lin Zhao, Rong Zhao	Physics	Multifunctional Carbon Nanotubes-Glass Fiber-Epoxy Composites with High Density Interfaces for Microwave Absorption and Structural Materials	A process for forming multifunctional carbon nanotubes-glass fiber-epoxy composites with high density interfaces for microwave absorption and structural materials application useful as a multifunctional microwave absorption and low-weight structural material without a need of additional coating.	10/13/2022	Pending
Fareed Dawan	Mechanical Engineering	Nanotube Film Enhanced 3-D Photoanode for Dye-Sensitive Photovoltaic Cell	The present invention teaches increasing the efficiency of a dye-sensitive solar cell by increasing the surface area of the DSSC photoanode. A thin film titanium oxide is deposited in trapezoidal shaped wells etched in the DSSC substrate. The thin-film titanium oxide is anodized to produce titanium oxide nanotubes on the inner surface of the trapezoidal shaped wells to further increase the surface area and incidence of light being temporarily trapped within the wells. A sensitized dye overlays the titanium oxide nanotubes to increase quantity of light absorbed by the titanium oxide nanotubes. A photoactive layer such as Cs2O may be deposited to enhance electron current contribution. A compatible transparent metal contact layer is deposited. This layer may be followed by a high-refractive index droplet over the well to act as a convex lens waveguide for incoming light. Electrical connections are then made to the frontside and backside metal contacts.	4/18/2023	Pending
Fareed Dawan	Mechanical Engineering	3D Printable Carbonated Polymer	The invention uses gas molecules as fillers in a polymer matrix to create a carbonated polymer with improved thermal and mechanical properties. These carbonated polymers can be 3D printed into various shapes using DLP technology.	6/12/2023	Pending

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Tapan Sarkar	Computer Science	Cloud-based Intelligent Tutoring System (ITS) using an Artificial Intelligence Engine	A method for an AI-based Intelligent Tutoring System (ITS) that assists teachers in designing learning activities for the students inside the classroom and collecting students' participation and performance data from these activities (e.g. attendance, quizzes, class tests, brainstorming, polling) via personal mobile phones to a cloud-based computing system. The invention uses artificial intelligence to evaluate such classroom participation and performance data in order to create personalized tutoring plans that are provided to students' mobile phones outside the classroom, allowing them to learn at their own pace and time. Thus, the AI-powered ITS of the invention continuously monitors students' learning outcomes inside and outside of the classroom and supplements classroom learning by individual tutoring outside the classroom using their mobile phones, until mastery of the topic is achieved. Depending on the volume of the learning material to be provided or for students who are visually challenged, the innovation can switch from text to voice. It leverages text-based access to the Internet without the need for expensive infrastructure.	11/28/2023	Pending
Tapan Sarkar	Computer Science	System for a Cloud-based Intelligent Tutoring System (ITS) using an Artificial Intelligence Engine	A system for an AI-based Intelligent Tutoring System (ITS) that assists teachers in designing learning activities for the students inside the classroom and collecting students' participation and performance data from these activities (e.g. attendance, quizzes, class tests, brainstorming, polling) via personal mobile phones to a cloud-based computing system. The invention uses artificial intelligence to evaluate such classroom participation and performance data in order to create personalized tutoring plans that are provided to students' mobile phones outside the classroom, allowing them to learn at their own pace and time. Thus, the AI-powered ITS of the invention continuously monitors students' learning outcomes inside and outside of the classroom and supplements classroom learning by individual tutoring outside the classroom using their mobile phones, until mastery of the topic is achieved. Depending on the volume of the learning material to be provided or for students who are visually challenged, the innovation can switch from text to voice. It leverages text-based access to the Internet without the need for expensive infrastructure.	2/6/2024	Pending