براءات الاختراع
لكرسي ابحاث السيرفاكتانت

الجهة مقدمة الطلب والجهة المانحة	عنوان البراءة وملخصها وتاريخها	م
جامعة الملك سعود كرسي ابحاث السيرفاكتانت EUROPEAN PATENT APPLICATION	**Patent Title: MICRO-STRUCTURED MATERIAL AND METHOD FOR THE PREPARATION THEREOF** **European Patent EP2769995 ,Kind Code: B1** **Inventors: Fakhry Dyab, Amro Khalil (King Saud University, Department of ChemistryP.O. Box 2455, 11451 Riyadh, SA)** **Application Number: EP20130155927** **Publication Date:02/03/2016** **Filing Date:02/20/2013** **Assignee:King Saud University (P.O. Box 800, 11421 Riyadh, SA)**	1
جامعة الملك سعود كرسي ابحاث السيرفاكتانت EUROPEAN PATENT APPLICATION	**Patent Title: COATED MAGNETIC NANOPARTICLES** **European Patent EP2804186 ,Kind Code: B1** **Inventors: Atta, Ayman Mohamady (King Saud UniversityP.O. Box 340406, 11333 Riyadh, SA) Dyab, Amro Khalil Fakhry (King Saud UniversityP.O. Box 340406, 11333 Riyadh, SA)** **Application Number: EP20130167616** **Publication Date:12/27/2017** **Filing Date:05/14/2013** **Assignee: King Saud University (P.O. Box 800, 11421 Riyadh, SA)**	2
King Saud University كرسي ابحاث السيرفاكتانت USPTO	**Patent Title: Method of fabricating macroporous carbon capsules from pollen grains** **United States Patent 9346678** **Abstract:** A method of producing macroporous carbon capsules includes providing pollen grains from date palm (*Phoenix dactylifera* L.) males, drying the pollen grains, heating the dried pollen grains to a temperature of at least 500° C. under an atmosphere of N_2 gas to produce macroporous carbon capsules. The macroporous carbon capsules produced from the above method can have an oval shape with a diameter in the range of about 18 μm to about 20 μm.	3

	The macroporous carbon capsules have a mean pore diameter in the range of about 50 nm to about 450 nm. The pores are three-dimensionally interconnected via nanoscopic carbon walls. The carbon walls have a thickness of about 4 μm. **Inventors: Alshehri, Saad M. (Riyadh, SA)** **Ahmad, Tansir (Riyadh, SA) Al-lohedan, Hamad A. (Riyadh, SA) Yamauchi, Yusuke (Sengen, JP)** **Application Number:14/884722** **Publication Date:05/24/2016** **Filing Date:10/15/2015** **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: Method of synthesizing silver nanoparticles from waste film** **United States Patent 9347114** **Abstract:** A method of synthesizing silver nanoparticles from waste film includes providing waste film including a silver halide salt and gelatin, mixing the waste film with an alkaline solution to form a mixture, heating the mixture, and subjecting the mixture to ultracentrifugation to isolate silver nanoparticles in the mixture. The film can include waste radiographic or photographic film pieces. Glucose and/or polyvinylpyrrolidone (PVP) may be added to the mixture. The nanoparticles can have an average particle size of about 2 nm to about 10 nm. The silver nanoparticles can be resistant to synthetic stomach fluid and showed high antimicrobial activity. **Inventors: Atta, Ayman Mohamamdy (Riyadh, SA) Al-lohedan, Hamad Abdullha (Riyadh, SA) Ezzat, Abdelrahman Osama (Riyadh, SA)** **Application Number: 14/874281** **Publication Date: 05/24/2016** **Filing Date: 10/02/2015** **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	**4**
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: Synthesis of zinc oxide nanocomposites using poly (ionic liquid)** **United States Patent 9468902** **Abstract:** The method of synthesizing zinc oxide polymer nanocomposite comprises: dissolving equal molar ratios of a sulfonic acid acrylic monomer and a co-monomer with a cross	**5**

	linking agent to form a solution; dispersing the zinc-oxide nanoparticles into the solution; polymerizing the sulfonic acid acrylic monomer with the co-monomer by adding a free radical initiator followed by heating up the solution to a temperature up to 50° C.; raising the temperature up to 60° C. until a zinc oxide polymer nanocomposite is formed; and curing the nanocomposite by heating to at least 105° C. for about 24 hours to form the zinc oxide polymer nanocomposite, wherein the ionic liquid monomer is 2-ccrylamido-2-methyl-1-propanesulfonic acid or a salt thereof and wherein the co-monomer is selected from the group consisting of vinyl pyrrolidone, acrylic acid and N-isopropyl acrylamide monomers. **Inventors: Atta, Ayman M. (Riyadh, SA)** **Al-lohedan, Hamad A. (Riyadh, SA)** **Ezzat, Abdelrahman Osama (Riyadh, SA)** **Application Number: 15/050433** **Publication Date: 10/18/2016** **Filing Date: 02/22/2016** **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**PatentTitle: Synthesis of modified chitosan particles for oral insulin delivery** **United States Patent 9828445** **Abstract:** Synthesis of modified chitosan particles for oral insulin delivery includes amidation of chitosan with a fatty acid, a modified fatty acid, and/or an amino acid. The amidated chitosan can be grafted with N-isopropylacrylamide (NIPAm) and cross-linked to provide the modified chitosan particles. **Inventors: Atta, Ayman M. (Cairo, EG)** **Al-lohedan, Hamad A. (Riyadh, SA)** **Ezzat, Abdelrahman O. (Riyadh, SA)** **Application Number: 15/378017** **Publication Date: 11/28/2017** **Filing Date:12/13/2016** **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	**6**
King Saud University	**Patent Title: Synthesis of bimetallic oxide nanocomposites using poly (ionic liquid)**	**7**

كرسي ابحاث السيرفاكتانت USPTO	**United States Patent 9850389** **Abstract:** A method of synthesizing bimetallic oxide nanocomposites includes the steps of: providing a first metal salt solution; adding an oxidizing agent to the first metal salt solution while degassing the solution with an inert gas; heating the first metal salt solution; adding a second metal salt solution to the heated first metal salt solution to form a reaction mixture; adding a solution comprising a poly (ionic liquid) into the reaction mixture; adding a first base into the reaction mixture; adding a second base while stirring and maintaining a temperature ranging from about 40° C. to about 65° C. to provide a solution including a bimetallic oxide nanocomposite precipitate. The first metallic salt solution can include $FeCl_3$ dissolved in water. The second metallic salt solution can include $CuCl_2$ dissolved in water. The bimetallic oxide nanocomposites can be combined with epoxy resin to coat a steel stubstrate. **Inventors:Atta, Ayman M. (Cairo, EG) Al-lohedan, Hamad A. (Riyadh, SA) Ezzat, Abdelrahman O. (Mansoura, EG) Abdullah, Mahmood M. S. (Taez, YE)** **Application Number: 15/466597** **Publication Date: 12/26/2017** **Filing Date: 03/22/2017** **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	
King Saud University كرسي ابحاث السيرفاكتانت USPTO	**Patent Title: Composition and method for enhanced oil recovery** **United States Patent 9850420** **Abstract:** The composition for enhanced oil recovery includes metal oxide or carbonate nanoparticles capped or encapsulated by a water soluble poly(ionic liquid) (PIL). The nanoparticles may be, e.g., $CaCO_3$, TiO_2, $Cu_2O.Fe_3O_4$, or ZrO_2. The poly(ionic liquid) may be a copolymer of 2-acrylamido-2-methyl-1-propanesulfonic acid (AMPS) with N-isopropyl acrylamide, N-vinyl pyrrolidone, methacrylic acid, or acrylamide. The composition is made by synthesizing the metal oxide or carbonate nanoparticles in the presence of the PIL. The resulting nanocomposite or nanomaterial alters the wettability of carbonate rock in a carbonate reservoir, releasing asphaltenic crude oil from the surface of the carbonate rock and replacing oil in the pores of the rock, thereby enhancing secondary and tertiary oil recovery. **Inventors: Atta, Ayman Mohamamdy (Riyadh, SA) Abdullah, Mahmood Mohammed (Riyadh, SA) Al-lohedan, Hamad Abdulla (Riyadh, SA)** **Application Number: 15/603378** **Publication Date: 12/26/2017**	**8**

	Filing Date: 05/23/2017 **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: Biosynthesized magnetic metal nanoparticles for oil spill remediation** **United States Patent 9901903** **Abstract:** The biosynthesized magnetic metal nanoparticles for oil spill remediation are magnetic nanoparticles capped with an extract of *Anthemis pseudocotula*. The magnetic nanoparticles are formed by co-precipitation of ferric chloride hexahydrate and ferrous chloride tetrahydrate in an ethanol solution of the extract with the dropwise addition of ammonium hydroxide to raise the pH to between 8 and 11. The extract may be an extract of the aerial parts of *Anthemis pseudocotula* in a low polar extraction solvent, such as an n-alkane solvent or mono-di-, or trichloromethane. The extract is hydrophobic, improving dispersion of the magnetic nanoparticles in oil spills in seawater, resulting in 90% removal of oil for a 1:10 ratio of nanoparticles:oil by weight. **Inventors:Abdullah, Mahmood M. S. (Riyadh, SA) Atta, Ayman M. (Riyadh, SA) Al-lohedan, Hamad A. (Riyadh, SA)** **Alkhathlan, Hamad Z. (Riyahd, SA) Khan, Merajuddin (Riyadh, SA) Ezzat, Abdulrahman O. (Riyadh, SA)** **Application Number: 15/705191** **Publication Date:02/27/2018** **Filing Date:09/14/2017** **Assignee:KING SAUD UNIVERSITY (Riyadh, SA)**	**9**
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: Combination microarray patch for drug delivery and electrochemotherapy device** **United States Patent 9968767** **Abstract:** The combination microarray patch for drug delivery and electrochemotherapy device is a medical device for delivering two separate pharmaceutical preparations to a patient, as well as providing electrostimulation for electroactive pharmaceuticals. A first pharmaceutical preparation is manually delivered into the patient through a first set of drug delivery needles. Similarly, a second pharmaceutical preparation is manually delivered into a patient through a second set of drug delivery needles. A desired electrical potential may then be selectively applied across first and second sets of electrotherapy needles for electroporation to facilitate delivery of the pharmaceutical preparations. The second pharmaceutical preparation may be a conjugate of the first for targeted drug delivery.	**10**

	Inventors: Hasan, Sartaj Tabassum (Riyadh, SA) ,Al-lohedan, Hamad A. (Riyadh, SA) **Application Number: 15/729490** **Publication Date: 05/15/2018** **Filing Date: 10/10/2017** **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: Composite electrode material for supercapacitors** **United States Patent 10014124** **Abstract:** The composite electrode material for supercapacitors includes mesoporous manganese dioxide (MnO2), graphene oxide, and nanoparticles of molybdenum disulfide (MoS_2). The composite material is prepared by preparing mesoporous manganese dioxide, preferably by surfactant-assisted precipitation, then mixing graphene oxide with the mesoporous MnO_2 is ethanol and ultrasonicating, and finally nanoparticles of MoS_2 are mixed with the suspension of graphene oxide and mesoporous MnO_2 to form the composite electrode material. The capacitance of the material may be varied by changing the concentration of MoS_2 nanoparticles. Samples of the composite electrode material exhibited good supercapacitance values, such as 527 and 1160 F/g. **Inventors: Ramalingam, Rajabathar Jothi (Riyadh, SA), Al-lohedan, Hamad Abdullah (Riyadh, SA)** **Application Number: 15/717646** **Publication Date: 07/03/2018** **Filing Date: 09/27/2017** **Assignee: KING SAUD UNIVERSITY (Riyadh, SA)**	**11**
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: (EN) Anti-quorum and DNA cleaving agent** **United States Patent 10053480** **Abstract: front page image** The anti-quorum and DNA cleaving agent is directed to a ruthenium complex formulated from dichloro-(η6-p-cymene) ruthenium(II) dimer and 2-chloroquinoxaline, the complex having the formula: embedded image	**12**

	The reaction cleaves the dimer, leaving a half-sandwich ruthenium complex with an η6 coordination bond to the arene ligand and an Ru—N bond attaching the chloroquinoxaline to the ruthenium complex. The agent has an anti-quorum sensing effect on bacteria, inhibiting the formation of biofilm and inhibiting bacterial virulence. The agent also binds to DNA and may cleave the DNA, e.g., at the N7 base pair of guanine, due to a hydrolytic mechanism, suggesting potential use as an anticancer or antitumor agent. **Inventors: Sartaj Tabassum,Hamad A. Al-Lohedan ,Hazem Ghabour , Mohd Sajid Ali,Rais Ahmad Khan , Fohad Mabood Husain** **Application Number: 15730637** **Application Date: 11.10.2017** **Publication Number: 10053480** **Publication Date: 21.08.2018** **Grant Number: 10053480 Grant Date: 21.08.2018** **Publication Kind: B1** **Applicants: KING SAUD UNIVERSITY**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: (EN) Method of making a porous nano-carbon electrode from biomass** **United States Patent 10090117** **Abstract: front page image** The method of making a porous carbon electrode is a chemical activation-based method of making a porous nanocarbon electrode for supercapacitors and the like. Recycled jackfruit (*Artocarpus heterophyllus*) peel waste is used as a precursor carbon source for producing the porous nanocarbon. A volume of jackfruit (*Artocarpus heterophyllus*) peel is collected, dried and then heated under vacuum to produce precursor carbon. The precursor carbon is mixed with phosphoric acid (H_3PO_4) to form a mixture, which is then stirred, dried and heated to yield porous nanocarbon. The porous nanocarbon is mixed with a binder, such as poly(vinylidenedifluoride), acetylene black, and an organic solvent, such as n-methyl pyrrolidinone, to form a paste. This paste is then coated on a strip of nickel foil to form the porous carbon electrode. **Inventors: Jothi Ramalingam, Siva Chidambaram, Judith Vijaya, Hamad Al-Lohedan** **Application Number: 15/872,892** **Application Date: 16.01.2018** **Publication Number: 10090117**	**13**

	Publication Date: 02.10.2018 **Grant Number: 10090117** **Grant Date: 02.10.2018** **Publication Kind: B1** **Applicants: KING SAUD UNIVERSITY**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: (EN) Hydrophobic nanoparticle compositions for crude oil collection** **United States Patent 10131556** **Abstract: front page image** Hydrophobic nanoparticle compositions include silica nanoparticles capped with asphaltene succinimide alkoxy silane (ASAS). The nanoparticles can have a particle size ranging from about 20 nm to about 10000 μm. The nanoparticle compositions can be used as a coating for raw sand to provide a super-hydrophobic sand. The nanoparticle compositions can be used as a coating for a polyurethane (PU) sponge to provide a super-hydrophobic sponge. The super-hydrophobic sand and/or super-hydrophobic sponge can be used to collect crude oil deposited in aquatic environments as a result of petroleum **crude oil spills.** **Inventors: Ayman M. Atta, Mahmood M. S. Abdullah Hamad A. Al-Lohedan** **Application Number: 15959074** **Application Date: 20.04.2018** **Publication Number: 10131556** **Publication Date: 20.11.2018** **Grant Number: 10131556** **Grant Date: 20.11.2018** **Publication Kind: B1** **Applicants: KING SAUD UNIVERSITY**	**14**
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: Method of making a supercapacitor using porous activated carbon from cow dung** **United States Patent: 10204745** **Abstract:** The method of making a supercapacitor using porous activated carbon from cow dung includes converting cow dung to porous activated carbon by, in a first step,	**15**

	preparing the dung waste by washing and drying the dung waste, and heating the dung waste in a vacuum environment to form pre-carbonized carbon. In a second step, the pre-carbonized carbon is impregnated with phosphoric acid to form a slurry, which is dried, ground, and heated in a vacuum to between 600-900° C. to form porous activated carbon. The porous activated carbon is mixed with a binder, acetylene black, and an organic solvent to form a paste, which is dried on a conductive metal foil to form an electrode. Two such electrodes (an anode and cathode) are coated with an electrolyte gel (e.g., aqueous potassium hydroxide) and separated by a polymer (e.g., PTFE) membrane to form the supercapacitor. **Inventors: Jothi Ramalingam Rajabathar (Chennai), Hamad Abdullah Al-Lohedan (Riyadh), Judith J. Vijaya (Chennai), M. Sivachidambaram (Chennai)** **Patent History** **Patent number: 10204745** **Type: Grant** **Filed: Apr 23, 2018** **Date of Patent: Feb 12, 2019** **Assignee: King Saud University (Riyadh)** **Application Number: 15/960,388**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title:Modification of sand with superhydrophobic silica/wax nanoparticles** **United States Patent 10202548** **Abstract:** The modification of sand with superhydrophobic silica/wax nanoparticles may provide for water storage, applicable, for example, in desert environments. In particular, highly thermal stable superhydrophobic coats for sand are made of nanoparticles composed of superhydrophobic silica capped with paraffin wax. Superhydrophobic sand modified by such nanoparticles addresses issues of water storage in desert environments, capitalizing on sand resource utilization. Superhydrophobic sand, as modified, has excellent water repellency and great water-holding capacity. The superhydrophobic sand modified with superhydrophobic silica/wax nanoparticles can be applied for the desert water storage for agriculture and planting. **Inventors: Ayman M. Atta (Cairo), Mahmood M. S. Abdullah (Taiz), Hamad A. Al-Lohedan (Riyadh), Abdelrahman O. Ezzat (Mansoura), Mohamed Hasan Wahby (Alexandria)** **Patent History** **Patent number: 10202548** **Type: Grant** **Filed: Apr 4, 2018** **Date of Patent: Feb 12, 2019**	**16**

	Assignee: King Saud University (Riyadh) **Application Number: 15/945,680**	
King Saud University كرسي ابحاث السيرفاكتانت **USPTO**	**Patent Title: Template-free method of preparing zeolites from biomass** **United States Patent 10,398,726B1** **Ramalingam , et al. September 3, 2019** **Abstract:** A template-free method of preparing zeolites from biomass can include using rice husk ash waste material as a precursor material. The zeolites can include ZSM-5 zeolites, such as, hierarchical pure zeolites and metal-loaded (Cu, Ni) ZSM-5 zeolites. This method allows for production of zeolites in a low cost and environmentally friendly manner. These ZSM-5 zeolites may be used for numerous applications, including killing cancer cells. The cancer cells may be human lung cancer cells. **Inventors: Jothi Ramalingam (Chennai), Jesu Doss (Riyadh), Judith Vijaya (Chennai), Hamad Al-Lohedan (Chennai)** **Patent number: 10398726** **Type: Grant** **Filed: Aug 30, 2018** **Date of Patent: Sep 3, 2019** **Assignee: King Saud University (Riyadh)** **Application Number: 16/118,37**	**17**