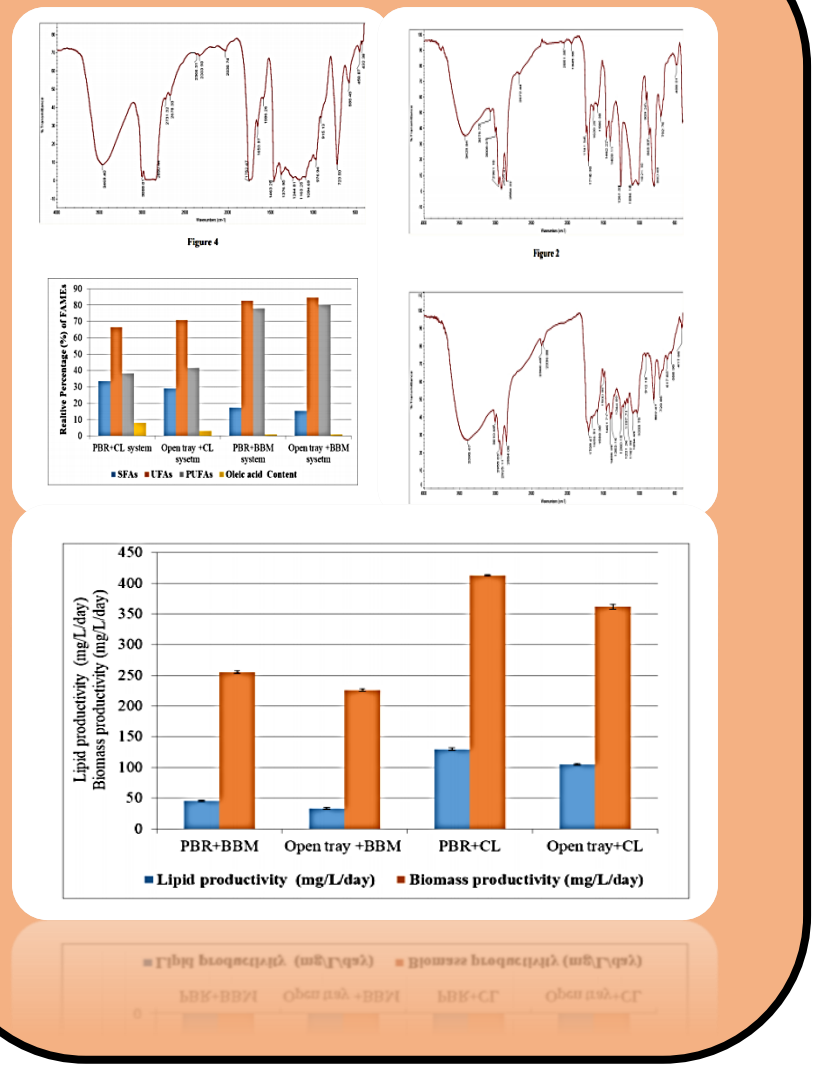
Chemical Science

Title: *Method for production of biodiesel from chlorella sp.*

Name of the inventor: *B.K. Gurjar, Vikas Pruthi and Richa Katiyar(CED, BT)*

Application number: *201811001749 (IN)*
Date of Patent Filing: *16.01.2018*

Summary: *The investigation first time reports the efficacy of de-oiled algal biomass extract (DOABE) for mixotrophic cultivation of chlorella sp. To enhance biodiesel production in open tray systems and in BioXpert-V2 software connected photobioreactor (PBR). The cultivation systems with addition of DOABE (PBR+DOABE and open tray +DOABE) as media were tested for quality and quantity of biodiesel. Data showed the presence of organic carbon and low nitrogen in DOABE, caused>2 folds higher biomass productivity and >4 folds enhanced lipid productivity, when cells were cultivated in both the cultivation systems as compared to control. Data has also recorded >2 folds higher lipid content (38.43±0.30% and 31.03±0.61%) in cells, grown in PBR+DOABE and in open tray +DOABE systems respectively that in control. Biochemical analysis of cells from both the systems revealed the decrease in total carbohydrates and protein contents. The FAMEs analyses showed vehicular quality biodiesel (high oleic acid content, low PUFA and high SFAs) obtained from chlorella sp. MCC27, when cultivated in both the cultivation systems (PBR +DOABE and open tray +DOABE) than in control. PBR+DOABE system showed edge over open tray +DOABE system in terms of biomass productivity and lipid content. While, the physical properties of biodiesel produced from chlorella sp. were in compliance with the fuel standards (ASTM D6751) and commercially used plant (Jatropha, plam) based biodiesel, when cells were cultivated in open tray +DOABE system than in PBR+DOABE system. Data revealed highest cetane number (CN;56.89), low cold filter plugging property (CFPP;-6.22°C), and approx. average oxidative stability (OS;3.50h). Collectively, this study highlights the use of recycled DOABE as a low cost feedstock for enhancing vehicular quality biodiesel production from microalgae.*

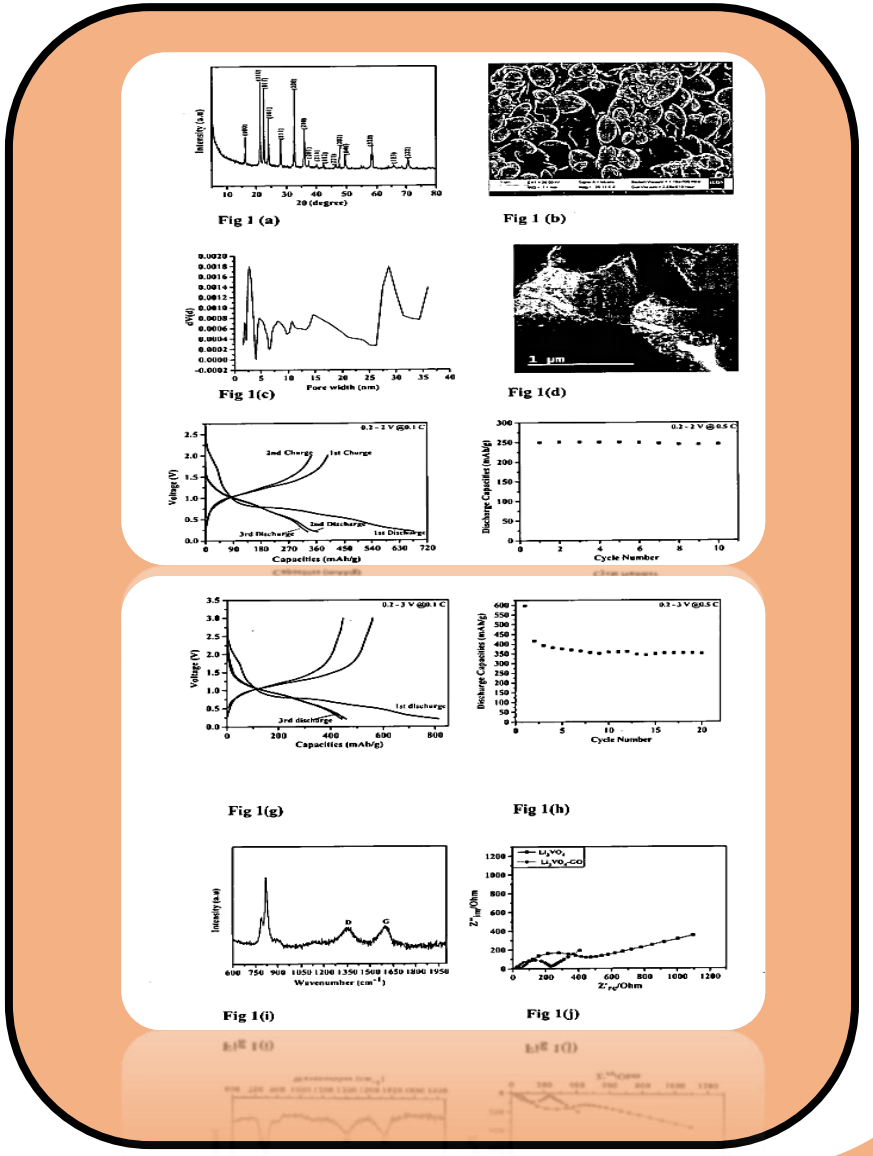


Title: *A method of synthesis of lithium vanadate on graphene oxide*

Name of the inventor: *Tapas Kumar Mandal and Nishant Gautam(CY)*

Application number:*201811022066 (IN)*
Date of Patent Filing:*13.06.2018*

Summary: *The present invention provides a simple, short and cheaper template free one-pot synthetic route for the preparation of hierarchical mesoporous Li_3VO_4 on grapheme oxide (GO) as an active anode material for lithium ion batteries (LIBs)*

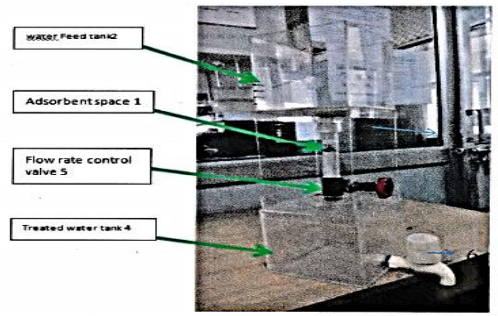


Title: *A system and method for simultaneous removal of arsenic and fluoride from contaminated water using novel hybrid adsorbent*

Name of the inventor: *Prasenjit Mondal, and Vineet Kumar Rathore(CHED)*

Application number:*201811026603 (IN)*
Date of Patent Filing:*17.07.2018*

Summary: *The present invention provides a system and method for simultaneous removal of arsenic (As) and fluoride (F) from contaminated water in a customized adsorption column (filter unit) using novel hybrid adsorbent. The system is easy to operate as it does not require any coagulants or oxidizing agents. It contains F reach ABTL and Al reaches AHNP, which are useful in removing As and F. The system uses a low cost adsorbent from laterite soil (ABTL) and aluminum oxide/hydroxide nanoparticle (AHNP) adsorbent with high As and F adsorption capacity, which were mixed in different ratio to get optimum recipe for addressing different situation with As and F in a wider range. The entire system works with the help of gravity, hence does not requires any power to operate*



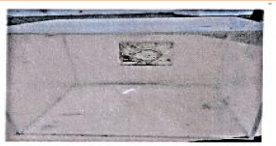


Figure 2

Figure 3

Figure 4

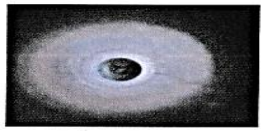


Figure 5

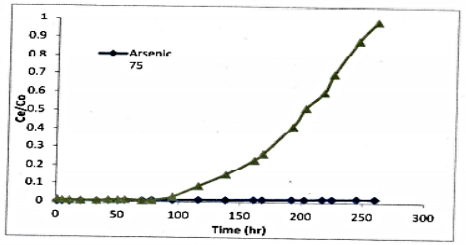


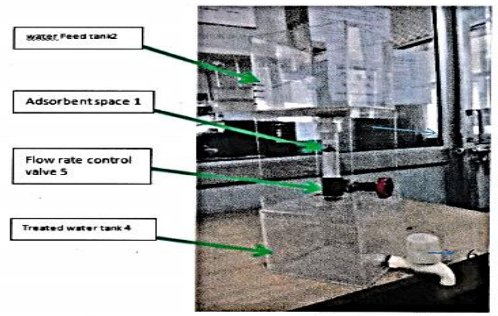
Figure 6

Title: *A system and method for simultaneous removal of arsenic and fluoride from contaminated water using novel hybrid adsorbent*

Name of the inventor: *Prasenjit Mondal, and Vineet Kumar Rathore(CHED)*

Application number:*201811026603 (IN)*
Date of Patent Filing:*17.07.2018*

Summary: *The present invention provides a system and method for simultaneous removal of arsenic (As) and fluoride (F) from contaminated water in a customized adsorption column (filter unit) using novel hybrid adsorbent. The system is easy to operate as it does not require any coagulants or oxidizing agents. It contains F reach ABTL and Al reaches AHNP, which are useful in removing As and F. The system uses a low cost adsorbent from laterite soil (ABTL) and aluminum oxide/hydroxide nanoparticle (AHNP) adsorbent with high As and F adsorption capacity, which were mixed in different ratio to get optimum recipe for addressing different situation with As and F in a wider range. The entire system works with the help of gravity, hence does not requires any power to operate*



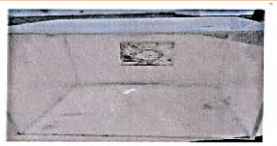


Figure 2

Figure 3

Figure 4

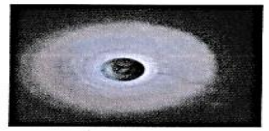


Figure 5

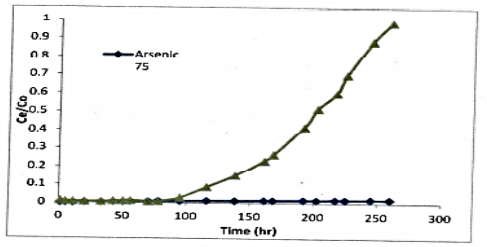


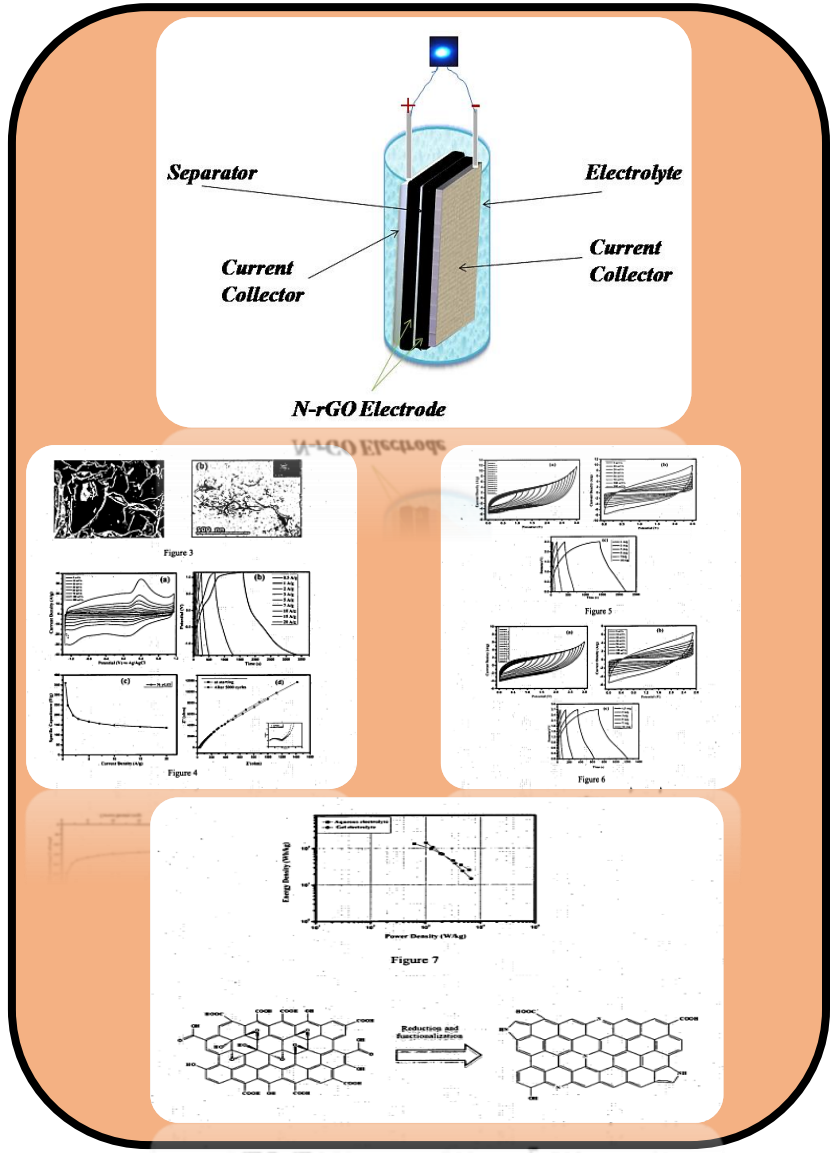
Figure 6

Title: *A method for synthesis of nitrogen–doped reduced graphene oxide (n–rgo) for high performance supercapacitor*

Name of the inventor: *Anil Kumar, and Sahil Thareja (CY)*

Application number:*201811031021(IN)*
Date of Patent Filing:*20.08.2018*

Summary: *Supercapacitor has been identified as one of the future energy storage devices due to its high power delivery capabilities, long cycle life, high operational temperature range and low charging/discharging time. One of the major issues with the supercapacitor based commercial devices is their poor energy density (5–10Wh/kg) as compared to those of lead acid (~30–40 Wh/kg) and Lithium–ion batteries (100–250Wh/kg), thereby limiting their applications as a substitute to the batteries. However, the supercapacitor may find supremacy in those areas where high power density is required. This would allow the burst–mode power delivery as required in load–levelling, acceleration/brakes in vehicles and memory backup (static random access memory (SRAM)). It is, therefore desirable to improve the energy density of supercapacitors while maintaining the power density.*
The present invention provides a greener wet method for the synthesis of nitrogen–doped reduced graphene oxide (N–rGO) as an electrode material, exhibiting high potential window with high energy density for high performance supercapacitor employing environment friendly aqueous electrolytic system.

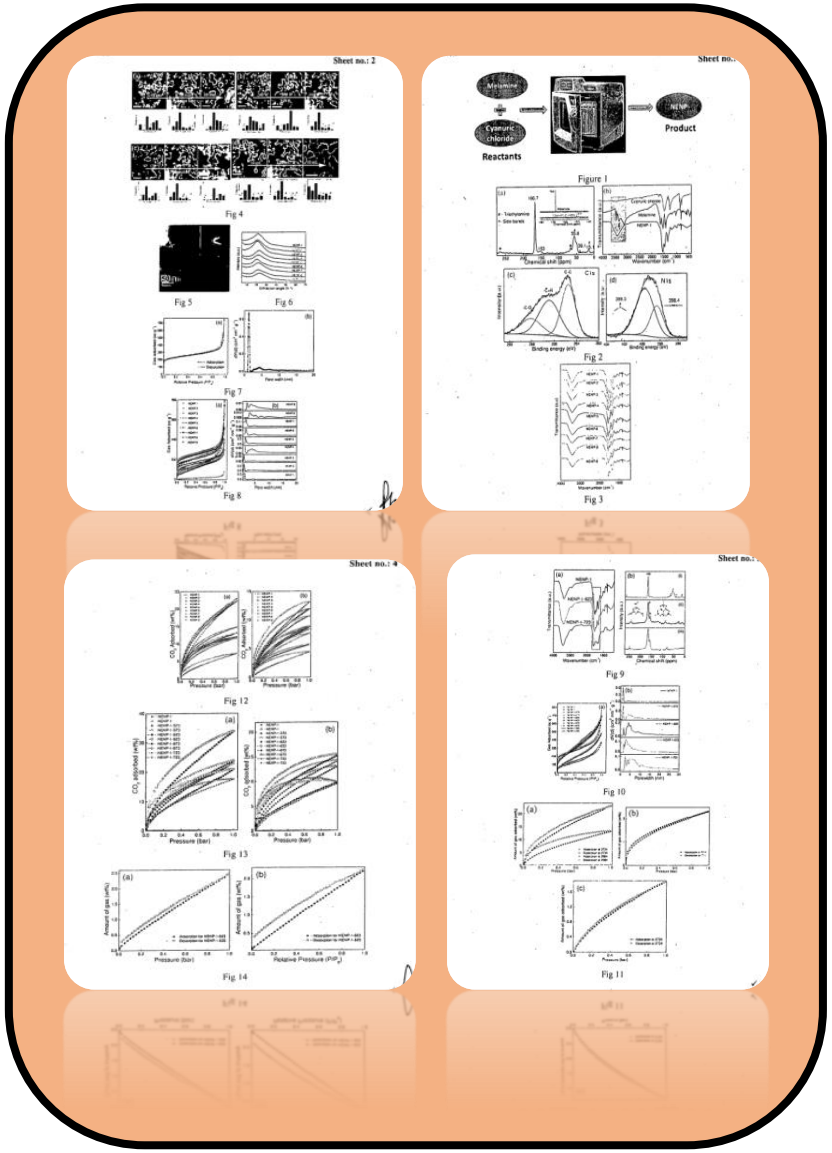


Title: *Process for synthesis nitrogen enriched high surface area nanoporouspolytriazines and their multi-functional applications*

Name of the inventor: *Paritosh Mohanty and Monika Chaudhary (CY)*

Application number: *201811045502 (IN)*
Date of Patent Filing*: 03.12.2018*

Summary: *The present invention provides an ultrafast microwave-assisted synthesis method to produce nitrogen-enriched nanoporous high surface area polytriazine that shows superior adsorbent application. Moreover, they show performance as electrode materials for super capacitors and as metal-free catalysts.*



Title: *Synthesis of N&P enriched hybrid material made from cyclophosphazene and 2,6–diaminopyridine for supercapacitor and gas sorption applications*

Name of the inventor: *Paritosh Mohanty and Nisha Dhiman (CY)*

Application number: *201911002957 (IN)*

Date of Patent Filing*. 24.01.2019*

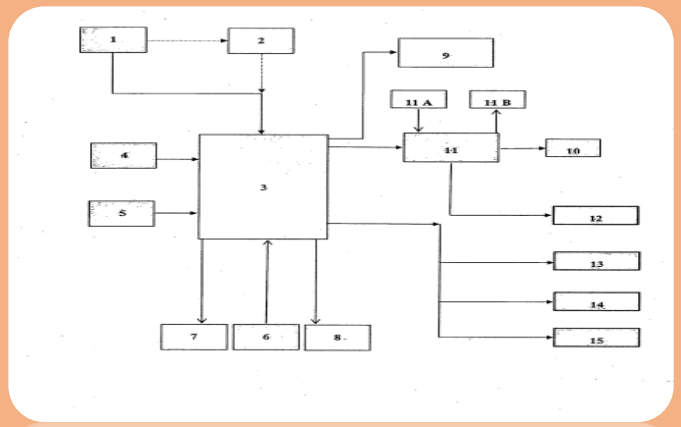
Summary: *The present invention provides the method of synthesis of heteroatoms (N and P) enriched inorganic hybrid material is which are synthesized by simple condensation of two inexpensive precursors, phosphonitrilic chloride trimer (PNC) and 2,6–diaminopyridine (DAP), The synthesized material is used as an electrode material for supercapacitor application. Facile synthesis and superior efficiency make this material a potential candidate as electrode material for the electrochemical supercapacitor application.*

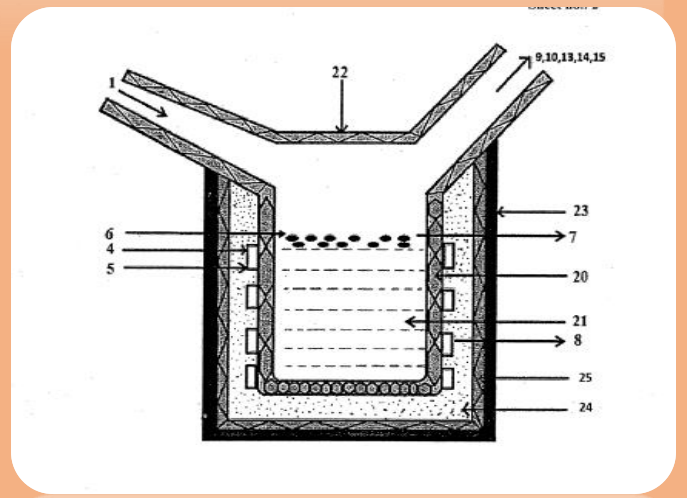
Title: *A method for producing synthesis gas from biomass residues*

Name of the inventor: *Basheshwer Prasad(CHED)*

Application number: *201911009915 (IN)*
Date of Patent Filing: *14.03.2019*

Summary: *The present invention provides a method of producing synthesis gas from carbonaceous feed stocks by flash pyrolysis carried out at elevated temperatures in molten cast iron reactor. The synthesis gas can be used for electricity generation, hydrogen production and fertilizers. Hydrocarbons may also be produced via Fischer–Tropsch synthesis.*



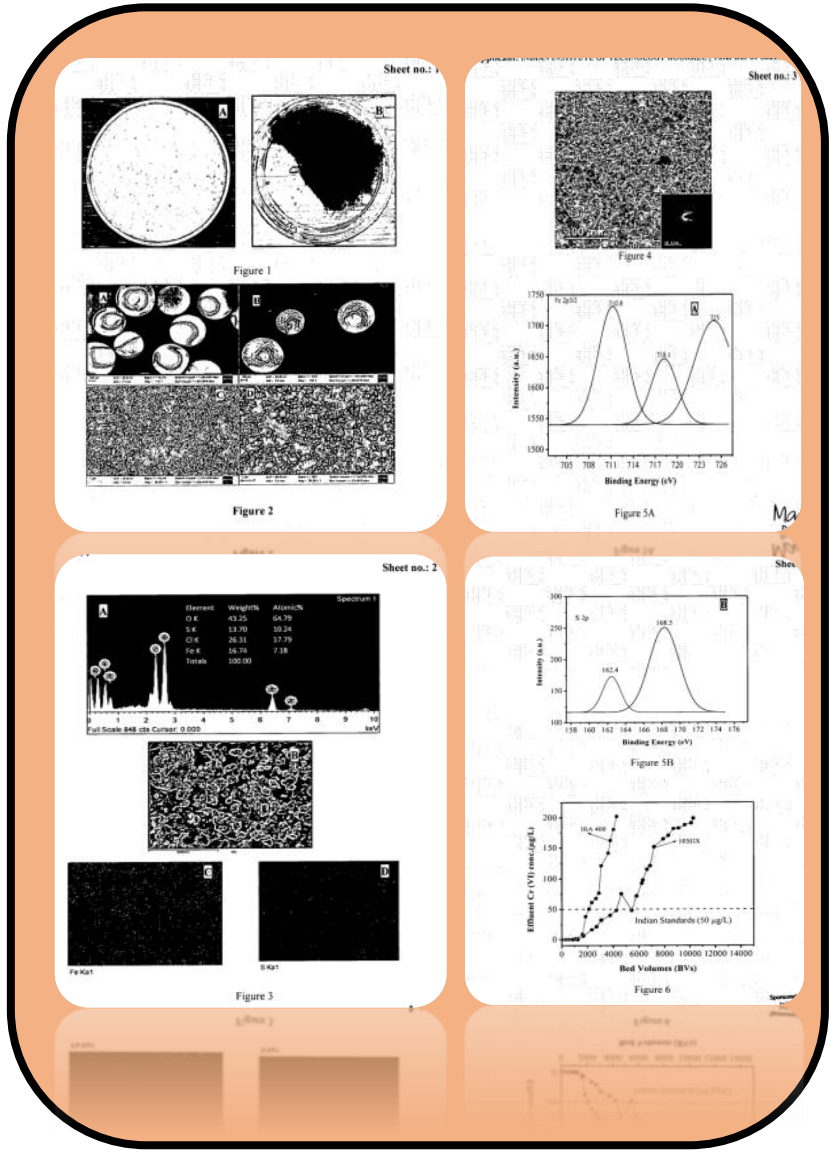


Title: *A hybrid iron sulfide impregnated anion exchanger (HISIIX) for selective removal of hexavalent chromium from contaminated water*

Name of the inventor: *Sudipta Sarkar and Laiju A. R(CED)*

Application number:*201911024269(IN)*
Date of Patent Filing: *19.06.2019*

Summary: *Present invention provides synthesis of hybrid Iron Sulfide Impregnated Anion Exchanger (HISIIX) for selective removal of hexavalent chromium from contaminated water. Anion exchange resin containing styrene–divinyl benzene matrix and quaternary ammonium functional group are kept in contact with 0.3M Na_2S solution in an orbital shaking incubator for 24 hour. After 24 hours, the ion exchanger is separated and washed thoroughly with distilled water before it was contacted with $FeCl_2$in an orbital shaker. The resultant material is black in colour, distinctly different from the golden yellow coloured parent ion exchanger. HISIIX thus prepared is washed and dried under nitrogen atmosphere at 50˚C and is stored in ethanol solution in airtight condition to prevent oxidation.*

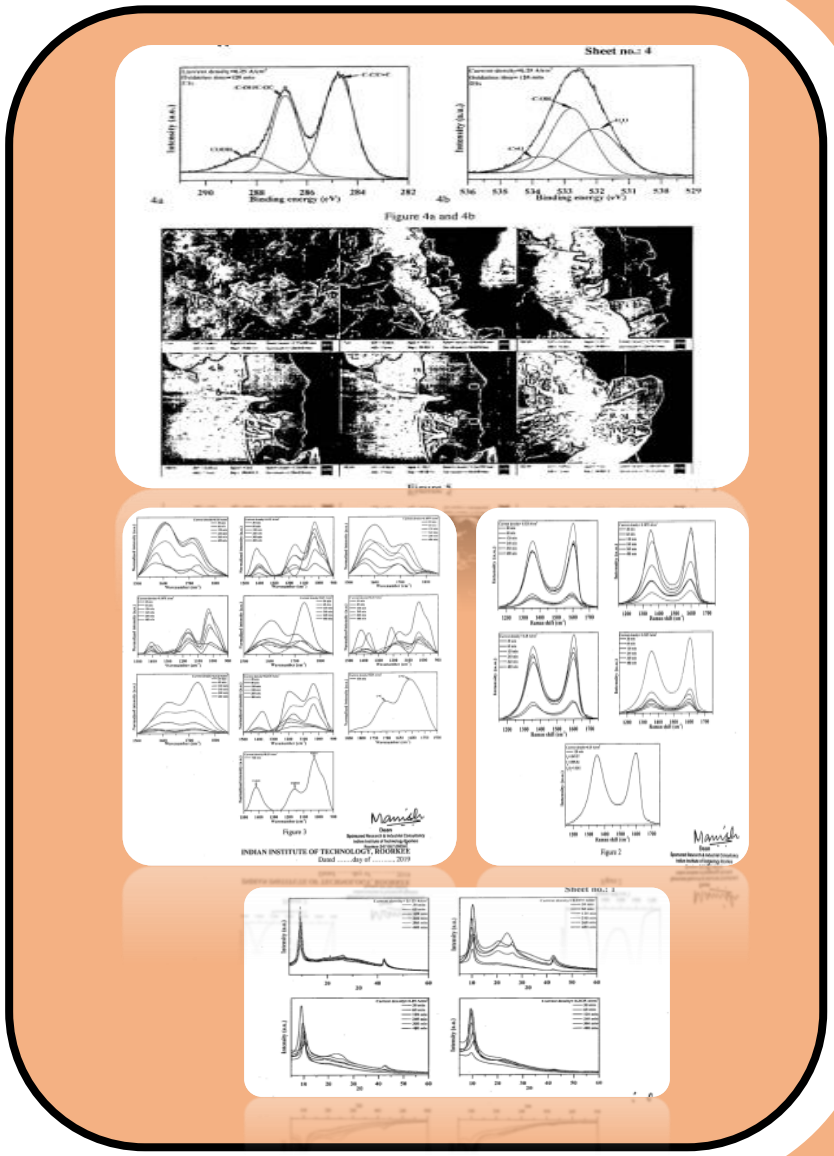


Title: *A one pot, two –step electrochemical method for the synthesis of graphene oxide and graphene oxide metal composite*

Name of the inventor: *Vimal Chandra Srivastava and Navneet Kumar (CHED)*

Application number:*201911026565 (IN)*
Date of Patent Filing:*03.07.2019*

Summary: *The present invention relates to the synthesis of graphene oxide (GO) and GO–metal composites. More particularly, the present invention relates to the electrochemical method for the synthesis of GO and GO–metal composites.*



Title: *A process for immobilization of metal oxide/ metal hydroxide nanofillers in paper matrices by a rapid microwave assisted method.*

Name of the inventor: *Paritosh Mohanty, Raeesh Muhammad, and Anuj Rawat(CY)*

Application number:*201911031624(IN)*
Date of Patent Filing*: 05.08.2019*

Summary: *Present invention provides a rapid microwave assisted method for the immobilization of various metal oxides nanofillers with a short experimental time. The methodology works for different metal oxides/hydroxides and substantially reduce the cost of the final products.*

Title: *A method of synthesizing pure phase sodium manganese silicate (Na_2MnSiO_4)*

Name of the inventor: *Yogesh Sharma and Harishpal Kumar (PHY)*

Application number: *201911032658(IN)*
Date of Patent Filing: *13.08.2019*

Summary: *The present invention provides a process for the preparation of sodium manganese silicate (Na_2MnSiO_4) useful as a cathode material for sodium ion battery. In accordance to the present invention, Na_2MnSiO_4 has been synthesized with pure phase by a quick, inexpensive and easy process i.e. combustion method. The process is more reliable for the scalable production of Na_2MnSiO_4.*

Title: *Modification of chemical composition and properties of A–TIG weld joints of dissimilar steels*

Name of the inventor: *D. K. Dwivedi, Anup Kulkarni, Pratishtha and Anagdha (MIED)*

Application number: *201911046518 (IN)*
Date of Patent Filing: *15.11.2019*

Summary: *The present invention relates to methods for improving the productivity of activated flux–tungsten inert gas welding (A–TIG) during dissimilar metal joining of heat resistant steels. The invention involves novel approaches of development of dissimilar steel joint such as insertion of metallic interlayers in between the faying surfaces and external wire feeding. The invention provides different approaches to allow the control of weld metal composition than conventional joints through different approaches such as use single/multiple interlayers and external wire feeding.*
Novel approaches provided by the present invention to fabricate A–TIG weld joints dissimilar metal combinations are:
1. Development of A–TIG welded joints between P91 steel and AISI 316L stainless steel by addition of interlayers
2. Development of functionally graded joints between P91 steel and AISI 316L stainless steel by employing multiple interlayers
3. Development of A–TIG welded joints between P92 steel and AISI 304H dissimilar steel combination by external feeding of Nickel based filler wire (ECrNiMo–3)

Argon is used as shielding gas for A–TIG welding during this work. Argon is an inert gas and does not react with the substrates. Hence no harmful gases are produced. Additionally, the activated fluxes (oxides) used in the work do not cause environmental hazards.

Title: *A synthesis process for the development of calcium silicate hydrate (C–S–H) based concrete hardening accelerator.*

Name of the inventor:*Sonalisa Ray, Saikat Das and Sudipta Sarkar, (CED with NBCC)*

Application number: *202011017217 (IN)*
Date of Patent Filing:*22.04.2020*

Summary: *The present invention relates to a simple synthesis method of C–S–H. A cation exchange resin column forms the heart of the process. When contacted with any electrolyte solution, the cation exchange resin shall exchange only the cations, without altering the composition of the anions present in the electrolyte solution. In the first step, the cation exchange resin in sodium form kept in a column is contacted with a dilute electrolyte solution containing calcium ions along with other*

Title: *A method of synthesis of nanoporous polymeric adsorbents from polycyclic aromatic hydrocarbons by microwave assisted method*

Name of the inventor: *Paritosh Mohanty, Raeesh Muhammad, and Anuj Rawat(CY)*

Application number:*202011019017 (IN)*
Date of Patent Filing: *04.05.2020*

Summary: *The present invention relates to the utilization of polycyclic aromatic hydrocarbons (PAHs), which is considered as air, water and soil pollutant, to synthesize high surface area nanoporous polymeric adsorbents. A rapid microwave assisted method was used for the polymerization process.*

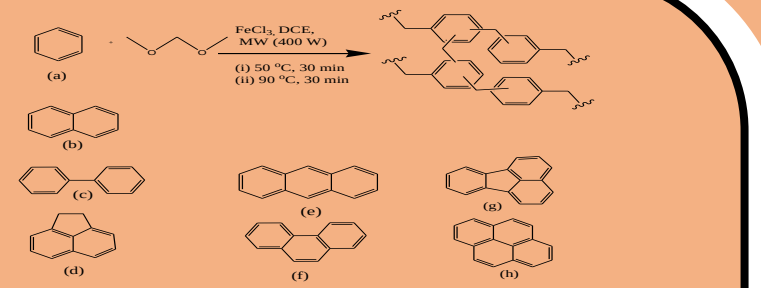


Figure 1a shows reaction scheme and different PAHs used as building blocks for the synthesis of poly–PAHs.

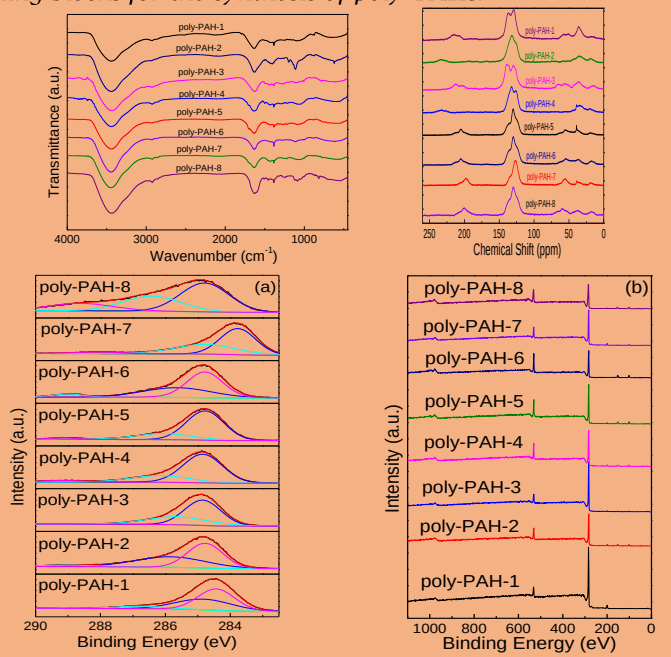


Figure 2 shows (a). C1s XPS high resolution scans of poly–PAHs, and (b). XPS survey scans of poly–PAHs.

Title: *A method of producing the polyhydroxyalkanoate (PHA) using waste water*

Name of the inventor:*Saugata Hazra and Girish Shroti (BT)*

Application number: *202011031817 (IN)*
Date of Patent Filing: *24.07.2020*

Summary: *The present invention relates to a system and method of producing the Polyhydroxyalkanoate (PHA) using waste water. The method utilizes the highly alkaline industrial waste water for the production of bioplastic, Polyhydroxy alkanoate (PHA). PHA is the naturally occurring green plastic produced by the microorganism using their enzymatic machinery.*

Title: *Mo–V–Nb–Te–O catalyst for the ammoxidation of propane to acrylonitrile*

Name of the inventor: *Prakash Biswas and Shishir Sinha (CHED & Centre of Excellence in Petro chemicals)*

Application number: *202011055866 (IN)*
Date of Patent Filing*: 22.12.2020*

Summary: *The present invention relates to a system and method for molybdenum, vanadium, niobium, tellurium oxide (Mo–V–Nb–Te–O) catalyst and its method of preparation for the ammoxidation of propane to acrylonitrile. The method proposes the production of acrylonitrile by the ammoxidation of low cost and abundantly available propane. The development of a highly efficient Mo–V–Nb–Te–O catalyst for selective conversion of propane to acrylonitrile at mild reaction condition is proposed.*