| Title | Brief description |
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| **Medical Devices** | |
| Mechanically stable drug eluting nanotubes for dental implants. | In order to enhance the clinical success of nanotubular orthopaedic/dental implants surfaces, a system is developed for fabricating uniform, biocompatible, and mechanically stable nanotubular surface/ nanotubes, on dental implants which are further loaded with the drugs to accelerate the process of osseointegration. |
| Orthopedic screw for easy recovery with minimal procedure | A novel multi-material is developed which improves the healing factor of the femoral and tibial bone under fracture and a design for easy removal of the screw post healing. It does not cut the bone tissues during insertion in the bone and thus reduces inflammation to the bone tissues. It avoids puncture through the bone of the patient having the orthopedic screws inserted, when the patient accidently encounters a fall. Upon healing of the bone from fracture, the removal of the orthopedic screw causes less or no blood-loss |
| Shoulder implant | The technology is helpful for orthopaedic implants, particularly in Anatomic Total Shoulder Arthroplasty. The prosthesis are implanted in one of the Glenoid and/or Humerus, to restore the functionality of the joint. |
| Microfluidic chip for improved and rapid testing of nucleic acid/DETECTION OF PATHOGENS | A system for rapid detection of pathogens/ micro-organism such as bacteria, virus, fungi, etc. to replace the long RT-PCR method |
| Software for diagnosis of cancer | Artificial intelligence (AI)-based low-power electronic hardware system is developed which can help in detecting malaria, tuberculosis, intestinal parasite and cervical cancer in a few milliseconds using neuromorphic hardware |
| Non-invasive handheld optical sensor for multi-analyte detection in saliva | A portable, non-invasive biosensor based system is developed for detection of multiple analytes in oral fluid, in-particular: glucose, urea and pH. |

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| Acellular artificial skin substitute for second degree burn | A novel bi- layered structured acellular artificial skin substitute or scaffolds is developed to prevent scar formation. It is a biodegradable and biocompatible substitute. It mimics the native extracellular matrix (ECM) properties and exhibits excellent adhesive and wound healing properties. |
| Heart attack Prediction System | A low cost, portable AI based Heart attack Prediction System is developed. The device can be used in infrastructure deprived community healthcare settings for screening and diagnosis of heart attack. It will be useful for Accredited Social Health Activists (ASHA) workers. |
| Elbow Implant | The existing metal or polymer implants are oversized and bulky and therefore more bone mass has to be removed to perfectly fit. To end this, an elbow implant is developed which is reduced in size and includes a minimum number of parts to ensure minimal bone loss with ease of assembly during a total elbow arthroplasty (TEA). It can restore the working of a human elbow joint with normal flexion and extension of 140° to 0°. It facilitates the normal daily tasks of the patients such as pick and place of the objects, eating food etc. |
| Ranibizumab Ocular drug delivey system | Development of Novel, minimally invasive intraocular drug delivery port device. The device/chemoport reduces the need of repeated piercing of the ocular tissues. The device also aims at providing a sustained release of the drug over a period of time |
| Exoskeleton device for upper and lower limb rehabilitation | Low cost, light weight, Self-operable and user friendly exoskeleton device is developed for Flexion and extension movement of wrist and finger joints. It provides precise repeatability and assistive therapeutic training |
| **Renewable/Alternative energy** | |
| Liquid hydrocarbons from plastic waste | A method is developed which can produce up to 750-800ml of fuel range liquid hydrocarbons from 1 kg of waste plastics. It uses of PE and PP (Single-use plastics) and produces 60 to 75% high-quality liquids having maximum C6-C28 range selectivity (66.39 %). The fuel can be directly used for the engine operation without further up-gradation. |
| Solar PV array fed water pumping system | a solar photovoltaic array powered synchronous reluctance motor (SyRM) driven water pumping system, for agricultural purpose in the remote areas, where grid is not available all the time |
| Photovoltaic system to track the maximum power point for maximum power extraction and method thereof | An economic A photovoltaic (PV) system is developed to track the maximum power point for maximum power extraction from the photovoltaic panel. It provide a steady state performance that is oscillation free and during dynamics conditions quickly track the global maximum power peak. |

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| Reconfigurable solar PV-battery supported small hydro based micro-grid | A microgrid system is developed with feeding three-phase 3-wire loads which can operate in reconfigurable modes using a permanent magnet synchronous generator, PMSG, as a hydro generator which has less loses, compact size and no additional excitation requirement compared to other generators. It is operable in standalone as well as grid connected modes with seamless transition between them. The technology provides a microgrid system having an integrated renewable source like hydro, two stage solar photovoltaic, PV, array connected to grid with battery support. |
| Electrochemical Preparation Method for Vanadium Electrolyte and its Application Thereof | An inexpensive replacement to vanadium sulfate is synthesized for VRFB electrolyte from vanadium pentoxide. The electrochemical performance of developed electrolyte from vanadium pentoxide shows similar charge–discharge profile, yet 1/5 the cost as compared to vanadium sulfate. |
| **Biotherapeutics** | |
| Stabilization of biotherapeuticas at high temperature | A formulation for stabilizing bio-therapeutics, which can be used for curative purposes. It provides unprecedented stabilization against heat induced protein degradation, in that the proteins (mAbs) remained stable in the formulation up to a temperature of 55 °C for 10 days. |
| Pegylation to enhance pharmacokinetic properties of proteins | PEGylation (chemical linkage of polyethylene glycol (PEG) chains) is widely used as a post-production modification methodology to enhance pharmacokinetic properties of proteins. An improved processes are developed which are able to remove all the multi-PEGylated impurities in the loading flow-through, simplifying the overall purification process and resulting in higher productivity and improved resin utilization. |
| Development of Ranibizumab Biosimilar | A novel continuous processing platform and refolding process developed for Ranibizumab Biosimilar which leads high purification yield and Reduced cost of manufacturing |
| Development of Trastuzumab Biosimilar | Novel continuous processing platform is developed for Trastuzumab Biosimilar which leads high purification yield and Reduced cost of manufacturing |
| A medicament for the treatment of diseases by biofilm forming microorganism | A medicament comprising a drug selected from a group consisting of acarbose, cyo closporine A, its pharmaceutically acceptable salts thereof, and combinations thereof, for use in treatment of diseases caused by biofilm forming microorganisms such as Mycobacterium tuberculosis |
| A 3D bioprinted scar tissue model | A bioink composition and a 3D bio printed scar tissue model is developed which closely replicates the physiological and architectural characteristics of naturally occurring scar tissue. The 3D bio printed scar tissue can be used to test scar resolution treatments among others. The Technology is successful in replicating the important characteristics similar to in vivo characteristics: (a) cellular alignment and precise control over orientation of newly synthesized ECM fibrous proteins, (b) presentation of specific biochemical signals, their sustained and controlled release and (c) controlled contractility of cells will lead to development of precise spatiotemporally controlled morphogen gradient. |

| **Purification/Sanitization** | |
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| Integrated purification system for air and water | An integrated system is developed, combining the two processes of air and water purification within a single device having a compact footprint. Both, polluted air and contaminated water are made to pass through multi-staged filtration processes which involve techniques such as particulate pre-filtration for eliminating large impurities and increasing the life of subsequent layers, activated carbon filtration for removing volatile organic compounds (VOCs) and other harmful gaseous pollutants, polymer, synthetic, or HEPA-based filtration for tackling PM2.5 pollutants and photochemical oxidation for immobilizing Sulphur Dioxide and oxides of Nitrogen present in the air, and sediment filtration, reverse osmosis and activated filtration for purifying particulates, dissolved impurities and VOC impurities present in water. |
| Antimicrobial formulation for porous and non-porous substrates/ Decontamination Spray for Fabric | The developed Aqua silver technology relates to using a coating composition for the coating on both porous and non-porous substrates comprising nanostructures; a potent antimicrobial agent, stabilizer and a film-forming polymer. The coating composition can show antibacterial, antifungal, antiviral, and antimold activity. The technology also relates to a method for preparation of a coating composition comprising adding a stabilizer in nanostructures to form an aqueous dispersion of nanostructures; dispersing the film-forming polymer in solid or liquid form in the aqueous dispersion of nanostructures; heating the dispersion along with stirring to obtain a homogenous dispersion and adjusting the final concentration of the nanostructures with water and/or alcohol. The coating composition of the technology can be used as a broad-spectrum antimicrobial formulation. |
| Decontamination wipes | Decontamination wipes are developed which can be used against dermal Chemical, Biological, Radiological and Nuclear contaminants. It is a single universal decontamination formulation against dermal CBRN contamination. The dermal decontamination body wipes are developed which are stable as per ICH guidelines by incorporating the active ingredients in them. |
| Air filters for filtration of airborne particles | A small, compact, light-weight and cost-effective.an air filter for separation of airborne particles from complex airstreams. An air filter that facilitates high filtration efficiency, low resistance to air flow, and high dirt holding capacity. This filter does not require frequent replacement of components of the air filter. |
| An apparatus for removal of arsenic from water | An apparatus for removal of arsenic from ground water and wastewater, that is safe and easy to handle. The apparatus is cost effective, highly efficient and regenerative |
| Antimicrobial non-woven fabric for safe water filtration | An antimicrobial non-woven fabric is developed for water filtration, which is cost-effective and has controlled leaching rate of the antimicrobial agents in water so that the drinking water contains permissible limits of such antimicrobial agent |

| **IoT** | |
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| IoT based person identification system using footfall signature | Intruder detection systems (based on anomaly detection) for detection of friends and foe. The device first predicts if an individual's footstep signature belongs to the pre-registered database. If the individual is legitimate then the device predicts its identity. Else, it generates a warning signal. It is useful in the military establishments/Smart homes for security and home automation/ Smart buildings for providing automatic access and detecting imposters. |
| Method of scheduling of tasks in an IOT network | Minimizing energy consumption is one of the most important problems in such IoT networks mainly because IoT nodes are distributed in the field with limited, unreliable, and intermittent sources of power. A method for scheduling of tasks with deadlines is developed in an IoT network of multicore processors so as to reduce the overall power consumption. The network is designed in such a way that deadlines are met and also, overall power consumption is minimal, the frequencies of the cores at each node need to be regulated on the basis of slack time that is available. significant energy consumption reduction (around 40%) with respect to simple DVFS based techniques, with little or no degradation in performance, or in terms of deadlines missed. |
| A retrofitted Smart Energy Metering Device | Smart energy metering device to track the consumption of electrical energy in real time without anomalies. A control and monitoring system for energy consumption of a building/home using existing energy metering infrastructure. conversion of the existing meter to a smart meter with a retrofitting solution |
| Smart appliances control device for a building energy management system | A low-cost smart appliances control device is developed to control the plurality of appliances connected in a building via multiple modes of communication such wi-fi, Bluetooth, Global System for Mobile Communication (GSM) and Local-Area Network (LAN). It monitors the real-time power consumption of appliances which will help in the health monitoring of appliances. It provides a retrofitting solution of smart appliances control to existing manual operated switches. Also, to keep manual switching operation in parallel to smart control device which is an add-on feature of bypass control during any communication failure of the smart appliance control device. |
| **Textile** | |
| Insect Repellent and Antibacterial Textile developed from waste lignocellulosic biomass | Green chemicals δ-Decalactone (DDL),2 nonene-4-one,and 6-amyl-α-pyrone (6PP) is devloped from waste lignocellulosic biomass which shows antibacterial properties and 87% mosquito repellence. The technology will be useful inTextiles, clothings and medical protective gears viz. masks, apron, surgery gowns, etc. |

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| System for making electro-conductive fabric | A solvent-less electrically-assisted oxidative chemical vapor deposition (EoCVD) process is developed for polymerization of inherently conducting monomer onto fabric to make it electrically conducting. The developed method provides flexible, non-metallic and highly conductive fabric material with electro-conductive polymer onto its surface and will be useful for electromagnetic shielding, heating pad, gas sensor, moisture sensor, and temperature sensor. |
| MOF Functional Textiles | A simple, rapid, eco-friendly and scalable process is developed for the preparation of MOF Functional textiles based on the simple textile finishing methods known as padding and curing. The process will be use to prepare anti-odor textiles and efficient functional materials for air purification/filtration, with high washing durability. |
| Conductive and flexible fibers | This is process for the fabrication of silver nanowire based highly conductive and stretchable hollow fiber. These hollow fibers of polyurethane (PU) solution spun with silver nanowires (AgNWs) prepared using wet spinning process deposited on the inner wall of the fibers to provide effective conductive path even at a very low concentration. The developed fibers also exhibit good conductivity even at high strains of 100% for repeated number of cycles confirming their good stability under stretching. The fabricated conductive hollow fiber mimics the electrical wire in a manner that it too contains an insulating cover over the conductive part. In addition, it exhibits high flexibility and stretchability unlike an electrical wire. |
| Dynamic yarn pullout testing device | A dynamic mode yarn pull-out force measurement device developed. This device provides enhanced force, velocity and impact energy during yarn pull-out. It is simple and easy arrangement of a yarn pull-out testing device and suitable for testing of high-performance fabric. The device also assists in the development of an effective bulletproof fabric. |