

GOVERNMENT OF INDIA  
DEPARTMENT OF ATOMIC ENERGY  
**RAJYA SABHA**  
**UNSTARRED QUESTION NO - 2251**  
ANSWERED ON 20/03/2025

**DAE's INTELLECTUAL PROPERTY AND CONTRIBUTION IN AGRICULTURE**

2251. DR. BHIM SINGH

Will the PRIME MINISTER be pleased to state:-

- (a) whether the Department of Atomic Energy (DAE) secures Intellectual Property Rights (IPR) for its invented products, processes and technologies; if so, the details thereof, including the data of patents obtained in India and abroad; and
- (b) whether the DAE is contributing to the agriculture sector; if so, the achievements of DAE in agriculture sector, the State-wise, particularly in reference to the State of Bihar?

**ANSWER**

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES AND PENSIONS  
AND PRIME MINISTER'S OFFICE (DR. JITENDRA SINGH)

- (a) As stipulated in the Patents Act, 1970 Section 4: "*No patent shall be granted for an invention related to atomic energy that falls within sub-section (1) of Section 20 of the Atomic Energy Act, 1962 (33 of 1962)*", the intellectual property generated by the Department related to Atomic Energy can't be patented in India. However, the department obtains a significant number of patent rights through R&D and spin-off technologies developed for the nuclear power programme of India. These patents pertain to application of its products, processes and technologies in various domains other than atomic energy.

DAE has obtained 234 patent rights in India since, 1985. (Details attached as Table-1)

DAE obtained 139 patent rights outside India since, 2001. (Details attached as Table-2)

- (b) Yes. DAE and BARC in particular is contributing to agriculture sector as described below, Till date seventy improved crop varieties have been Gazette notified for commercial cultivation across the country for fourteen different crops namely oilseeds (groundnut, mustard, soybean, sesame, linseed and sunflower), pulses (urd bean, mung bean, pigeonpea, cowpea), rice, wheat, sorghum and jute. Some of the desirable traits in these crops include higher yield, larger seed size, improved agronomic and quality traits, early maturity and resistance to biotic and abiotic stresses. Many of these varieties have high patronage from the farming community and are extensively cultivated in the country. The list of crop varieties released in various States is shown in the Table 3.

With reference to Bihar, seven high yielding crop varieties namely Mungbean (TMB-37), Groundnut (TG-51, TG-37A, TPG-41, TG-38, TG-22), Linseed (TL 99) were released for commercial cultivation by farmers.

In addition to crop improvement, DAE's contributions in the development of crop production and protection technologies are deployment of technologies related to,

1. Soil and water management,
2. Novel fertilizer formulations,
3. Biodegradable waste management,
4. Botanical and microbe-based pesticides,
5. Plant growth regulators and
6. Pesticide residue detection kits.

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**Table-1: Details of Patents granted in India**

<b>Sr. No.</b>	<b>Title of the Invention</b>	<b>Patent No.</b>	<b>Grant Date</b>	<b>Application Country</b>
1.	A Method of Chemically Three Dimensionally Crosslinking Polyvinyl Alcohol	153797	01-Nov-1985	India
2.	Process for Preparation of Anti-Leprosy Vaccine	153031	26-May-1985	India
3.	A Method of Manufacturing Mechanically Stable Three Dimensionally Cross-Linked Polyvinyl Alcohol by An Ionising Radiation	153994	16-Aug-1985	India
4.	A Device for Removing Human Blood Toxins	153999	13-Dec-1985	India
5.	A Method of Chemically Three Dimensionally Crosslinking Polyvinyl Alcohol	153801	31-Jan-1986	India
6.	A Method & Device for In-Situ Casting of a Tubular Membrane Directly on A Porous Tubule or Capillary for Use in Reverse Osmosis Tubular Modules.	162173	18-Nov-1988	India
7.	A Method and A Device for In-Situ Casting of a Tubular Membrane Directly in A Porous Support Tube for Use In Reverse Osmosis Tubular Modules	162174	18-Nov-1988	India
8.	A Reverse Osmosis Tubular Module for Use in A Reverse Osmosis Plant	158830	25-Aug-1989	India
9.	A Method for The Manufacture of Sulphide Ion Sensitive or Selective Silver Sulphide Electrode for Use in Electrochemical Cells	160612	17-Jun-1988	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
10.	An Improved Reverse Osmosis Tubular Module for Use in A Reverse Osmosis Plant	166048	12-Oct-1990	India
11.	A Telescopic Electrode Seal Device for Use in A Completely Closed Electric Arc Furnace and Such A Furnace Having The Same	166974	22-Mar-1991	India
12.	A Fixed Mirror Line Focus Solar Concentrator with Cylindrical Mirror Elements.	172328	27-May-1994	India
13.	An Improved Method for The Detoxification of Fluorine Containing Aqueous Effluent	167969	03-Jan-1992	India
14.	A Porous Electrode for Use in a Filter-Press Type High Pressure Alkaline Water Electrolyser Cell Module and a Method of Manufacturing the Same.	172456	10-Jun-1994	India
15.	An Integral Bipolar Plate for Use in a Filter-Press Type High Pressure Alkaline Water Electrolyser Cell Module and a Method of Manufacturing the Same	172485	24-Jun-1994	India
16.	An Improved Filter-Press Type High Pressure Alkaline Water Electrolyser Cell Module	172486	24-Jun-1994	India
17.	A Birefringent Crystal Lens Light Beam Polariser	173464	16-Dec-1994	India
18.	A Collapsible Solar Dryer	173519	30-Dec-1994	India
19.	A Bio Catalyst for the Preparation of Invert Sugar Syrup from Aqueous Sucrose Solution and a Method of Making the Same	177144	16-May-1997	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
20.	A Continuous Single Step Bio Catalytic Process for the Preparation of Invert Sugar Syrup from Aqueous Sucrose Solution and A Bioreactor for Carrying out the Same.	177145	16-May-1997	India
21.	A Process for the Preparation of An Aqueous Emulsion Pressure Sensitive Adhesive (also Refer 490/BOM/1997)	181789	06-Aug-1999	India
22.	A Process for the Preparation of a Pectinolytic Enzyme Complex Comprising Polygalacturonase Pectin Esterase and Pectin Llyase from a New Microbial Strain of <i>Aspergillus Niger van Tiegh</i>	182245	17-Sep-1999	India
23.	A Process for Enzymatic Liquefaction of Unconventional Fruits	182962	25-Feb-2000	India
24.	A High Angular and Spatial Resolution Phase Gradient Interferometer	183095	07-Apr-2000	India
25.	A Highly Cross-Linked Silicone Membrane for Liquid Support and a Method of Making the Same	185680	05-Oct-2001	India
26.	A Process for the Synthesis of 5,10,15,20-tetrakis [3,4-biscarboxymethyleneoxy)phenyl] Porphyrin from 3,4-di(carbethoxymethyleneoxy) Benzaldehyde for Detection / Treatment of Tumours.	180992	07-Feb-1998	India
27.	A Process for the Synthesis of 5,10,15,20-tetrakis[3,4-biscarboxymethyleneoxy)phenyl] chlorin from 5, 10, 15, 20-tetrakis[3,4-di(carbethoxymethyleneoxy)phenyl] Porphyrin for Detection / Treatment of Tumours.	180480	01-Jan-1999	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
28.	A Process for the Manufacture of an Unsupported Integrally Skinned asymmetric semipermeable Polyether Amide Hydrazide Polymeric Membrane for Use in Reverse Osmosis	186375	01-Mar-2002	India
29.	A Solvent Exchange cum Immersion Precipitation Process for the Manufacture of Asymmetric Semipermeable Aromatic Polyamide Polymeric Membrane for Use in Reverse Osmosis	186210	08-Feb-2002	India
30.	A Hydrogen Sensor for Measurement of Diffusible Hydrogen in Weldment	186660	17-May-2002	India
31.	An Optical Probe for Qualitative Evaluation / Measurement of Defects in a Ferromagnetic Material Component	186620	17-May-2002	India
32.	An Optical Probe for Quantitative Evaluation / Measurement of Defects in a Ferromagnetic Material Component	186574	03-May-2002	India
33.	A Process for the Preparation of an Aqueous Emulsion Pressure Sensitive Adhesive Label (Divisional Application to 390/BOM/1994)	182181	03-Sep-1999	India
34.	A Process for the Preparation of an Immunomodulator from the Ayurvedic Medicinal Plant, <i>Culvel (Tinospora Sp.)</i>	183805	22-Apr-2000	India
35.	Cadmium Sulfide (CdS) Nano Crystalline Particulates and Thin Film thereof Particularly for Use as Luminescent or Visible Light Emitting Elements under UV irradiation & a Single step process for the Preparation of the Same	187205	27-Sep-2002	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
36.	A Process for Isolating Podophyllotoxin from the Genus Podophyllum Particularly the Plant Species Emodi Wall	187287	04-Oct-2002	India
37.	A Process for the Preparation of the Anti Cancer drug N[4-{2,4diamino-6-pteridinyl}methyl] methylaminobenzoyl]-L-glutamic Acid commonly known as Methotrexate & Pharmaceutically Acceptable Salts Thereof	182947	16-Jun-2000	India
38.	An Acrylamide-based Gamma Ray Dosimeter Using Ultrasonic	187206	06-Aug-2002	India
39.	An Ultrasonic Device for Measuring Residual Monomer in a Polymer Solution Particularly Polyacrylamide	187485	15-Nov-2002	India
40.	An Apparatus for Producing Laser-based Etching on Surfaces of Articles of Metals, Alloys and Ceramics	189001	29-Aug-2003	India
41.	A Method of Preparing a Mechanically Strong Hydrophilic Polyvinyl Alcohol Hydrogel	187486	15-Nov-2002	India
42.	A Process for the Preparation of Anti-Sera of Protein named PV2 for Detection of Malaria	192707	01-May-2004	India
43.	A Device for Detecting Defects such as Scratches and Cracks on an Electrically Conductive Surface	190427	28-Jan-2004	India
44.	A Method for Treating Exhaust Gas Emission Produced During Combustion of Coal in a Coal Combustion Plant for Reducing Suspended Particulate Matters	194122	23-Feb-2005	India
45.	A Modular Device for Generating High Voltage Impulses	191318	20-May-2004	India
46.	A Modular Device for Generating High Voltage Impulses	191316	20-May-2004	India

<b>Sr. No.</b>	<b>Title of the Invention</b>	<b>Patent No.</b>	<b>Grant Date</b>	<b>Application Country</b>
47.	A Device for Transduction of Spatially Patterned Signals to and / or from Oral Surface	192082	01-Aug-2004	India
48.	A System for Projection and Transmission of Spatially and Temporally Patterned Signals onto Oral Surface	191531	31-May-2004	India
49.	A Device for Detection and Acquisition of Spatially & Temporally Patterned Signals from Oral Surface	192719	01-Aug-2004	India
50.	A Process for the Preparation of Europium Activated Red Emitting Yttrium Phosphate Vanadate Phosphor with Boron	194131	23-Feb-2005	India
51.	A Process for the Isolation of Recombinant Nucleotide Sequence Comprising 1-2381 Base Pairs (bp) for Early Detection of Oral Cancer (also Refer 868/MUM/2001)	188744	08-Aug-2003	India
52.	An Electronic Device for Recording Blood Flow Signal Variability	195350	07-Jun-2005	India
53.	A Spiral Wound Dry Polyamide Element for Membrane Filtration and a Method of Making the Same	194106	22-Feb-2005	India
54.	A Method of Making a Supported Dry Asymmetric Polyamide Membrane for Membrane Filtration	194101	09-May-2005	India
55.	A High-Pressure Vessel for Membrane Filtration	195317	07-Jun-2005	India
56.	A Device for Detecting Leaks in Tubes	193457	22-Feb-2005	India
57.	A Split Coil Probe for Steel Wire Rope Inspection	193458	29-Mar-2005	India
58.	A Device for Dynamic Compensation of Slow Responding Transducer	196522	22-Dec-2005	India



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59.	An Impedance Cardio Vasograph	196540	12-Jan-2006	India
60.	A One Stage Irradiation Process for Manufacture of Hydrogel Dressing Free of Synthetic Plasticizers	192136	29-Sep-2004	India
61.	An Improved Process for the Preparation of Magnetisable Cellulose Particle	193445	20-Jan-2005	India
62.	A Composition of Magnetisable Microcrystalline Cellulose Particle	193912	22-Feb-2005	India
63.	An Improved Process for Producing Mixed Oxide Coated Titanium Electrodes having Enhanced Life in Electrochemical Applications and the Electrodes so Prepared	195371	07-Jun-2005	India
64.	System for Deposition of Carbon Films and Process for the Same	204221	09-Feb-2007	India
65.	A Process for Manufacture of Polymeric Films with Electro-Active Patterns Printed on Them	204360	15-Feb-2007	India
66.	Preloaded Parabolic Dish Antenna and the Method of Making it	207809	28-Jun-2007	India
67.	An Apparatus for Electro-Reflectance and Surface Photo Voltage Spectroscopies in Soft Contact Mode	204169	12-Jan-2007	India
68.	An Improved Process for Preparing Stabilized Biological Preparation such as Oral Polio Vaccine (OPV)	197836	09-Mar-2006	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
69.	A Process for Depositing electronic Ceramic Oxide Thin Films with Controlled Oxygen Stoichiometry on Different Substrate Materials	205887	12-Apr-2007	India
70.	Online Process Instrumentation Loop Calibrator	197786	17-Jan-2006	India
71.	A Process for Preparation of Banana Juice and Banana Powder from Ripe Bananas ( <i>Musa Cavendish</i> )	189999	05-Jan-2004	India
72.	A Process for the Preparation of Insect Communication Modifier from <i>Zanthoxylum Alatum</i> Seed Oil	190566	20-Apr-2004	India
73.	Electronic Voting Machine	199087	06-Mar-2006	India
74.	A Low-Cost Digital Pocket Dosimeter	197797	01-Feb-2006	India
75.	An Improved Process for Providing Hard Chromium Nitride Coating on Substrates and a Coated Substrate so Obtained.	198325	06-Apr-2006	India
76.	A Process for the Preparation of MgO Stabilised Beta Alumina	215156	20-Feb-2008	India
77.	A Compact Kit for the Rapid Detection and Estimation of Protonophoric Pollutants in Waste Waters	198326	06-Apr-2006	India
78.	A Process for Production of Zinc Oxide based Varistor from Zinc Ore	204633	28-Feb-2007	India
79.	A Process for Preparation of High Purity Zinc Oxide Powder from Zinc Calcine	204974	01-Mar-2007	India
80.	A Process for Producing Disilicides of Molybdenum, Tungsten and their Solid Solution	206958	16-May-2007	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
81.	A Process for the Preparation of a Kit Comprising Recombinant Nucleotide Sequence comprising 1-2381 Base Pairs (bp) for Early Detection of Oral Cancer (Divisional App. To 392/BOM/1999)	189625	30-Sep-2003	India
82.	An Improved Room Temperature Chemical Vapour Deposition Process for the Deposition of Poly(phenylenevinylene) in the Manufacture of Organic based Electronic Devices	215159	21-Feb-2008	India
83.	Process for In-Situ Preparation of Electrolyte for Measuring Hydrogen in High Temperature Fluids	198013	01-Feb-2006	India
84.	A Measuring System for Online Measurement of Corrosion Rate of Metals in an Aqueous Medium	204092	06-Dec-2006	India
85.	An Improved Method of Detection of Target Nucleic Acid Sequence by Nucleic Acid Amplification	196040	08-Sep-2005	India
86.	An Improved Apparatus for Measuring Forces Between Colloidal Particles or Droplets	195921	03-Apr-2005	India
87.	A Tuneable Optical Filter	196063	17-Oct-2005	India
88.	A Process for the Manufacture of Composites	241751	23-Jul-2010	India
89.	A Process for Manufacture of Half Metallic Ferromagnet with CrO <sub>2</sub> or Composites of CrO <sub>2</sub> Chromium Sesquioxide	204533	23-Feb-2007	India
90.	An Apparatus and A Method for Optical Tweezer-based System for Trapping and Controlled Rotation of Trapped Microscopic Objects.	205080	01-Mar-2007	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
91.	A Liquid Phase Epitaxy Process for Manufacturing Separately Confined Strained Heterostructure Devices such as Diode Laser Emitting at Narrow Wavelength Region Within 650-1600 nm	195956	02-Sep-2005	India
92.	Ammonia Absorption Refrigeration System with Improved Coefficient of Performance	205574	04-Apr-2007	India
93.	Ultrafiltration Membrane Water Purification Device	195961	02-Sep-2005	India
94.	A Process for the Treatment of Austenitic Stainless Steel	200100	17-Apr-2006	India
95.	Stabilised Magnetic Emulsion and a Process of Making it	205114	01-Mar-2007	India
96.	Process for Manufacture of Novel Compound Exhibiting Magneto-Electric Coupling and High Dielectric Constant at Room Temperature	203429	01-Nov-2006	India
97.	Process for the Preparation of Ceria Nano Powder Suitable for Optical Polishing	207569	14-Jun-2007	India
98.	A Batch Reactor for Producing Metal Oxides	207053	21-May-2007	India
99.	A Process for Treatment of Waste Water Containing Nitrate Ions	222102	21-Jul-2008	India
100.	Apparatus and Method for Transport of Microscopic Object(s)	240966	10-Jun-2010	India
101.	A Tuneable Laser with a single Tuning Element and a Wavelength Selector Operating in Both Side of a Dispersive Resonator	198772	07-Feb-2006	India
102.	A Method for Maintaining Freshness and Extension of Shelf life of Cut-Flowers	210507	05-Oct-2007	India

<b>Sr. No.</b>	<b>Title of the Invention</b>	<b>Patent No.</b>	<b>Grant Date</b>	<b>Application Country</b>
103.	A Novel Compound Exhibiting Magneto-Electric Coupling and High Dielectric Constant at Room Temperature	225691	20-Nov-2008	India
104.	An Electro Mechanical Method for Cost Effective	198509	30-Jan-2006	India
105.	A Furnace for Preparing Low Melting Metal Granules	231518	05-Mar-2009	India
106.	An Improved Sub-Ambient Phase Change Composition	234952	22-Jun-2009	India
107.	A Kit for the Detection of Target Nucleic Acid Sequence by Nucleic Acid Amplification	235792	27-Aug-2009	India
108.	Prism Mount Adapter	244151	19-Nov-2010	India
109.	A System for Precision Angular Motion Mechanism for Alignment and Positioning of Optical Elements	209080	28-Aug-2007	India
110.	Process for Direct Somatic Embryogenesis from Immature Inflorescence Segments of Sugarcane	243371	08-Oct-2010	India
111.	Enzymatic Process for Debittering of Protein Hydrolysate Using Immobilised Peptidases	252516	21-May-2012	India
112.	Biometric Technique for Personal Identification based on Multiple Patterns on Fingers from Nail Side of the Hand	255627	12-Mar-2013	India
113.	A Penetration Enhancing Flux Formulation for Tungsten Inert Gas (TIG) Welding of Austenitic Stainless Steel and its Application	266346	30-Apr-2015	India
114.	A Method and System for Non-Intrusive on-line Detection of Turbine Blade Condition	300828	07-Sep-2018	India

<b>Sr. No.</b>	<b>Title of the Invention</b>	<b>Patent No.</b>	<b>Grant Date</b>	<b>Application Country</b>
115.	Zinc Fertilizer Formulation and Process for Producing the Same	239929	12-Apr-2010	India
116.	A Phosphorus Fertilizer Formulation and a Process of Making it	238485	08-Feb-2010	India
117.	Process for Preparing Metal Complexes of 1,3 Diketones Using Ultrasound	236638	13-Nov-2009	India
118.	A Method of Qualifying Niobium and/or Other Super Conducting Materials for Reliable Fabrication of Super Conducting Radio Frequency (SCRF) Cavities	288175	09-Oct-2017	India
119.	A Hydraulic Micrometer System for Remote Measurement of Inside Diameter of Pipes and Tubes and a Method of such Measurement	327440	16-Dec-2019	India
120.	Process for Development of a High resistance Austenitic Stainless Steel	272698	20-Apr-2016	India
121.	A Process for the Treatment of Cellulose-based Waste for Removal of Hazardous Materials and Recovery of Valuables	256258	23-May-2013	India
122.	A Method and Apparatus for "Block Encryption" and "Synchronous Stream Cipher (SSC)"	396872	13-May-2022	India
123.	Generator of Collimated Variable Diameter Hollow Laser Beam	269505	26-Oct-2015	India
124.	A Liquid based Thin Layer Cyto Preparation for Liquid-based Cytology	282981	28-Apr-2017	India
125.	Single Fibre Grid with Improved Spatial Resolution in Distributed Optical Fibre Sensor System	280741	27-Feb-2017	India

<b>Sr. No.</b>	<b>Title of the Invention</b>	<b>Patent No.</b>	<b>Grant Date</b>	<b>Application Country</b>
126.	Niobium based Super Conducting Radio Frequency (SCRF) Cavities Comprising Niobium Components Joined by Laser Welding	341058	10-Jul-2020	India
127.	Biological Laser Plasma X-Ray Point Source	356014	18-Jan-2021	India
128.	Improved Path Length Fibre Optic Probe for On-line and Off-line Spectrophotometric Assay	291011	22-Dec-2017	India
129.	Fire Retardant Intumescent High Density Rigid Polyurethane Foam for Specialty Applications	277138	11-Nov-2016	India
130.	A Flexible Magnetic Membrane based Actuation System and Devices Involving the Same	425538	16-Mar-2023	India
131.	An Improved Process for Production of High-Grade Synthetic Rutile from Titaniferrous Ores	289211	03-Nov-2017	India
132.	An Optical Source, its Method of Preparation and its Application Thereof	285356	18-Jul-2017	India
133.	A Finishing Device	418577	19-Jan-2023	India
134.	A Single Layer Irradiated Functional Clay-Polymer Nano Composite Film and its Method of Preparation	286015	02-Aug-2017	India
135.	Micromachined Metal Diaphragm based Fabry-Perot Fibre Optics Sensor System and Data Processing Involving the Same	359492	25-Feb-2021	India
136.	An Improved Process for Production of High Pure Submicron Yttria Stabilized Zirconia Powder from Zircon	286134	08-Aug-2017	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
137.	A Tri-Vane Spiral Vacuum Booster Device for Pumping High Volumetric Fluid at Low Pressure	312335	06-May-2019	India
138.	Novel Plasmodium Protein as Malarial Vaccine and Drug Target	310142	27-Mar-2019	India
139.	Improved Process for the Electrochemical Synthesis of Palladium Nano Particles in Ionic Liquid as an Electrolyte	280179	13-Feb-2017	India
140.	Conformal Hydrodynamic Nano-Polishing Machine and Process	336494	05-May-2020	India
141.	A Process for Producing Ultrapure Titanium Dioxide from Titan Ferrous Ore and Slag Sample	277309	17-Nov-2016	India
142.	A 6-Axis Parallel Kinematic Manipulator	395835	29-Apr-2022	India
143.	A Novel Method of Synthesis of Rhodium Metal Foam using Room Temperature Ionic Liquids	279100	11-Jan-2017	India
144.	A Method of Preparation of Potassium Fluoroborate (KBF <sub>4</sub> )	287491	19-Sep-2017	India
145.	A Storage Stable Microbial Decontaminated Litchi ( <i>Litchi Chinensis</i> ) with Extended Shelf Life Retaining Pericarp Colour and a Process Thereof	333456	28-Feb-2020	India
146.	Innovative, Inexpensive and Viable Method for the Isolation of Novel Antioxidant Flavonoids from the Weed, <i>Coronopus Didymus</i>	410220	28-Oct-2022	India
147.	An Apparatus and A Method for Authenticating Hard Copy Documents with Images and Template	459083	13-Oct-2023	India



Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
148.	A Dual-Purpose Atomic Device for Realising Atomic Frequency Standard and Magnetic Field Measurement	345150	26-Aug-2020	India
149.	A Method for Large-Scale Synthesis of Optically Stimulated Luminescence Grade Polycrystalline Ceramic Material	341683	15-Jul-2020	India
150.	A Wound Dressing Capable of In-situ NO <sub>x</sub> Release and a Process for Manufacturing the Same	300809	06-Sep-2018	India
151.	An Improved Ground Fault Protection Mechanism for Quick Detection and Isolation of a Ground Fault to Prevent Damages in Parallel or Upstream Circuits Associated with Electrical Power Supply System	429581	21-Apr-2023	India
152.	Creep Machine for Conducting Creep Tests in Flowing Liquid Sodium with Enhanced Safety Features	349533	19-Oct-2020	India
153.	A Method for Synthesis of Resol Beads with Good Control over their Size	383451	01-Dec-2021	India
154.	Thermal Plasma Process for 'Inflight' Dissociation of Zircon Mineral	303530	27-Nov-2018	India
155.	Compact Pulse Transformer with Transmission Line Embodiment	418035	13-Jan-2023	India
156.	Charged Thin Film Composite Nano-Filtration Membranes and Process of its Production	308260	27-Feb-2019	India
157.	A Transitional Joint Comprising of Dissimilar Metal Joint and a Diffusion Bonding Shrink Fit Process for Producing the Same	418098	16-Jan-2023	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
158.	High Density Self Compacting Concrete and the Method of Preparing the Same	503533	25-Jan-2024	India
159.	A Method and Device for Tuning SCRF Cavity	371293	07-Jul-2021	India
160.	A Process for Production of Pure Zirconium Oxide from Zircon	334038	05-Mar-2020	India
161.	Nanofiltration Membranes with Surface Negative Charge for Fractional Separation of Mono and Multivalent Ionic Species	343289	04-Aug-2020	India
162.	Energy Harvest System	448160	29-Aug-2023	India
163.	A Micro-Trench based Biochip Device for Screening of Infectious Diseases using Metal Nano Particles / Nano Coating	415484	26-Dec-2022	India
164.	Metal Complex of Chlorophyll Derivative for Magnetic Resonance Imaging and Photodynamic Therapy	343156	03-Aug-2020	India
165.	Synthesis of Fibrous Nano-Silica Spheres with controlled Particle Size, Fibre Density, and Various Textural Properties	364791	16-Apr-2021	India
166.	A System and Method for Micro-Drilling with Microwaves through Metallic Concentrator	426457	23-Mar-2023	India
167.	Mechanical Grippers for Handling Plurality of Micro-Components	393042	25-Mar-2022	India
168.	A Method for Preparing Chlorine-Dioxide Releasing Polymer	365155	22-Apr-2021	India
169.	System comprising Sun Ray Collimating Central Mirror and Heliostat	481280	12-Dec-2023	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
170.	High Voltage DC Power Supply with Full Range 24 Pulsed Input and Ripple Free Output for RF Amplifiers	436206	28-Jun-2023	India
171.	A Method for Making Single Integrated Cut-Through Artistic Design on Metallic Foil	394243	05-Apr-2022	India
172.	A Process for Depositing Hard, Hydrophobic, Mechanically, Thermally and Chemically Stable Polymer Films on Bell Metal	268130	18-Aug-2015	India
173.	A Novel Method of Depositing Corrosion Resistant Metal Nitride Hard Coating with Nano Particle Strengthened Nickel-Based Composite Coatings as Interlayer on Steel Substrates	290986	22-Dec-2017	India
174.	Identification of Surrogate Protein Markers for Falciparum and Vivax Malaria using Proteomic Approaches	336131	20-Apr-2020	India
175.	A Process for Solvent Extraction for Separation of Rare Earth Elements (REE) Through Partial Reflux of Rare Earths in Solvent based on Separation Factor	397001	17-May-2022	India
176.	A pH Measurement System for Slurries in Batch Application	503773	26-Jan-2024	India
177.	A Incremental Sheet Forming Process	502564	23-Jan-2024	India
178.	Air Plasma Torch	437320	05-Jul-2023	India
179.	A Process for Fabricating Carbon Nanotube Incorporated Ballistic Resistant Armour Panels and Products Thereof	528921	19-03-2024	India
180.	Process for Preparing Cucurbituril in High Yield	510424	13-Feb-2024	India
181.	A Coupling Device for Joining Solid / Hollow Shafts	486141	20-Dec-2023	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
182.	An improved Method of Manufacturing Actively Cooled Accelerator Grid with full penetration Weld Configuration	481223	12-Dec-2023	India
183.	A Filter with Developed Sorbent Composite Material for removing Toxic Metal Contaminants for Aqueous Systems	420937	08-Feb-2023	India
184.	A Method of Independent Control Over Size and Density of Nanoparticles for Fabricating Metal Nanoparticle Embedded MOS Capacitor and a Metal Nanoparticle Embedded MOS Capacitor Thereof for Non-Volatile Memory Applications	438391	12-Jul-2023	India
185.	High Voltage DC Power Supply Circuit	403371	11-Aug-2022	India
186.	Flame Retardant Transparent liquid based on novel functionalized Graphene Quantum Dot	369812	21-Jun-2021	India
187.	An Improved Laser Welding Method for Enhanced Weld Quality and Enhanced Surface Smoothness	447308	25-Aug-2023	India
188.	Multifunctional Superabsorbent Cotton and Process for Preparation thereof	353741	16-Dec-2020	India
189.	A liquid Nitrogen Based Portable Refrigeration System for Carrying Refrigerated Goods	502550	23-Jan-2024	India
190.	A Wideband Hybrid High Power MW Level CW Radio Frequency (RF) Combiner / Splitter	426278	22-Mar-2023	India
191.	MW Level CW Single Pole Double Throw (SPDT) Coaxial Radio Frequency (RF) Switch	426292	22-Mar-2023	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
192.	Human Neural Precursor Cells with Inducible <i>STIM1</i> Knockdown	399095	14-Jun-2022	India
193.	Splitted Plasma Anode Fire-ball based Ion Source for both Nanopatterning and Thin Film deposition	413565	05-Dec-2022	India
194.	A Method for Increasing the Life of Cutting Tools	488119	22-Dec-2023	India
195.	Fixative Composition for Preservation and Recovery of Leucocytes of Biological Samples	499818	16-Jan-2024	India
196.	Leak Arresting Gripper for Pipes	469789	16-Nov-2023	India
197.	Displacement Decoupling Arrangement for Piping Systems	502670	24-Jan-2024	India
198.	A Novel Universal Multi-Nutrient Soil Extractant for Assessing Bio-Availability of Nutrients in Soil	358936	19-Feb-2021	India
199.	A Novel Cryogenic Vacuum Producing System	504062	29-Jan-2024	India
200.	A Method for Diffusion Bonding of Piezoelectric Crystal to Metal Wear Plate	508553	08-Feb-2024	India
201.	Process for Determination of parts per billion (ppb) levels of Total Iron in Boiler Coolant Water	351799	20-Nov-2020	India
202.	A Pass-Through Type Infra-Red and Ultra-Violet Beam Visualizer Device based on Rare-Earth Doped Transparent Ceramic	463706	30-Oct-2023	India
203.	Metal-Carbon Aerogel Composite Electrode, Aerogel Supercapacitors, Process of the same and Application thereof	390312	24-Feb-2022	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
204.	Method for Bio-beads Development for Normal and Saline Wastewater Treatment	381341	08-Nov-2021	India
205.	System and Method for Screening Chest X-Ray Image for Diagnosis	451958	15-Sep-2023	India
206.	Method for Developing W-Cu Functionality Graded Composites Using High Energy Ball Milling and Spark Plasma Sintering	523195	11-Mar-2024	India
207.	Developing Protocol for Depositing Adhesive, Durable and Protective Layers of Homogenous Y <sub>2</sub> O <sub>3</sub> coating on the Interior Surface of Quartz Tube by Solution Technique	366061	04-May-2021	India
208.	Development of Flexible High Temperature Superconductor (HTS) Cable for Shaped Coils	501364	19-Jan-2024	India
209.	Magnesium Nano-Particles to Capture and Convert CO <sub>2</sub> to Methane, Methanol for Formic Acid or Other Fuels or Chemicals	484592	18-Dec-2023	India
210.	Process for the Creation and Tuning of Defects in Nano-Silica to produce Defected Nano-Silica	366272	07-May-2021	India
211.	Process for Developing Dendritic Plasmonic Colloidosomes as Nano-Heaters and Nano-Catalysts	404105	22-Aug-2022	India
212.	Remotely Operated Self-Locking Fixture for Wall Mounted Equipment for Contaminated Enclosures	391338	07-Mar-2022	India
213.	Leak Tight Flange and Gasket Assembly	485220	19-Dec-2023	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
214.	<i>Escherichia coli</i> Cell Factory for Producing Recombinant Phosphopeptides	407999	29-Sep-2022	India
215.	A Method for producing Stable Lithium Silicates Nano-sponges for capturing CO <sub>2</sub>	507049	05-Feb-2024	India
216.	Apparatus for Non-Destructive Evaluation of Cylindrical Objects using Gamma-Ray Emitting Radioisotope Source	517803	29-Feb-2024	India
217.	Acidic Amorphous Aluminosilicates (AAS) Solid Acid for Catalysis, Plastic Degradation and CO <sub>2</sub> to Fuel Conversion	388563	04-Feb-2022	India
218.	Asymmetric Rotating Impeller Extraction Column	382169	22-Nov-2021	India
219.	Liposomes and A Process for Preparing the Same Using Supercooled Micelle and Emulsion	390956	02-Mar-2022	India
220.	Mechanically Reliable Water Repellent Finish Breathable Cotton Fabric and Electron Beam Assisted Bio-inspired Preparation Process of the Same	501727	22-Jan-2024	India
221.	Nickel Based Superalloy with Ni <sub>3</sub> (Cr, Mo, Ti, W) Stoichiometry	521226	07-Mar-2024	India
222.	Modular and Compact Helical Biodegradable Waste Converter	531960	05-Apr-2024	India
223.	Process to Determine parts per billion levels of Ammonia in Water with Emphasis on Boiler Coolant Water	463966	31-Oct-2023	India
224.	Magnetic Flowmeter for Electrically Conducting Liquids	455892	29-Sep-2023	India
225.	A Chlorophyllin Containing Pharmaceutical Composition for Prevention of Pathogenesis of Coronavirus Disease	557545	07-Jan-2025	India

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
226.	Novel Magneto-Liposomes for Active Fibrosarcoma Tumour Targeting and Combinatorial Chemo-, Radio- and Magnetic Hyperthermia Therapy of Cancer	441803	31-Jul-2023	India
227.	A Method of Preparation of Forward Osmosis Membrane using Synthesized Poly(sulfone-co-amide) Polymer	408427	03-Oct-2022	India
228.	An Apparatus to Generate Large Plasma Arc Plume for Waste Disposal and Thermal Processing Applications	432380	22-05-2023	India
229.	Multi-tube Membrane Reactor with Provision for Molten Salt Heating for Hydrogen Production using Solar Heat	540025	30-05-2024	India
230.	Epoxy Resin based Adhesive and Preparation Method thereof	407521	26-Sep-2022	India
231.	Plasmonic Hybrid Nano Catalyst Including Nickel Supported on Plasmonic Colloidosomes and Methods Involving the Same	454950	26-Sep-2023	India
232.	Compact Hydraulic Pinned Jaw Crusher System with High Size Reduction Ratio	506151	01-Feb-2024	India
233.	A System for Carrying Out Active Microrheology to Probe Viscoelasticity of Protein	539208	24-May-2024	India
234.	Copper Laden Titanium Dioxide Coated Silica Nanospheres as Active and Stable Catalyst for CO <sub>2</sub> to CO Conversion with 99% Selectivity	551864	03-Oct-2024	India



**Table-2: Details of Patents granted outside India**

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
1.	Switch Useful at Superconducting Temperatures and Comprising Superconducting Material	6184765	06-Feb-2001	USA
2.	Preloaded Parabolic Dish Antenna and the Method of Making it	6911958	28-Jun-2005	USA
3.	Preloaded Parabolic Dish Antenna and the Method of Making it	CN100416920C	03-Sep-2008	China
4.	Preloaded Parabolic Dish Antenna and the Method of Making it	2001278672	28-Oct-2004	Australia
5.	A Low-Cost Digital Pocket Dosimeter	7009182	07-Mar-2006	USA
6.	Solvent Extraction Process for Recovery of Uranium from Phosphoric Acid (25-55% P <sub>2</sub> O <sub>5</sub> )	6645453B2	11-Nov-2003	USA
7.	MET / FRET based Method of Target Acid Detection whereby the Donor / Acceptor Moieties are on Complementary Strands	4457001	12-Feb-2010	Japan
8.	Chromium Dioxide (CrO <sub>2</sub> ) and Composites of Chromium Dioxide and Other Oxides of Chromium such as CrO <sub>2</sub> /Cr <sub>2</sub> O <sub>3</sub> and CrO <sub>2</sub> /Cr <sub>2</sub> O <sub>5</sub> and Process for Manufacturing the Same	7276226	02-Oct-2007	USA
9.	Two-Cycle Selective Counter-Current Extraction Using bis(2-ethylhexyl) Phosphate and tri-n-Butyl Phosphate and Refined Kerosene as Synergistic Extractant System on H <sub>2</sub> O <sub>2</sub> Treated H <sub>3</sub> PO <sub>4</sub> , and Stripping the Loaded Extract with Strong H <sub>3</sub> PO <sub>4</sub> Containing Metallic Iron to Lower Redox Potential.	7192563	20-Mar-2007	USA

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
10.	A Process for Recovery of High Purity Uranium from Fertiliser Grade Weak Phosphoric Acid	1511869	29-Mar-2006	EP-UK
11.	A Process for Recovery of High Purity Uranium from Fertiliser Grade Weak Phosphoric Acid	1511869	29-Mar-2006	EP-Germany
12.	A Process for Recovery of High Purity Uranium from Fertiliser Grade Weak Phosphoric Acid	1511869	29-Mar-2006	EP-Belgium
13.	A Process for Recovery of High Purity Uranium from Fertiliser Grade Weak Phosphoric Acid	1511869	29-Mar-2006	EP-Spain
14.	A Process for Recovery of High Purity Uranium from Fertiliser Grade Weak Phosphoric Acid	1511869	29-Mar-2006	EP-Italy
15.	A Process for Recovery of High Purity Uranium from Fertiliser Grade Weak Phosphoric Acid	1511869	29-Mar-2006	EP-France
16.	A Pulsed Driven, Helium-Free Transversely Excited Atmospheric (TEA) Pressure CO <sub>2</sub> Laser	6950453 B2	27-Sep-2005	USA
17.	Device for Measuring and Quantitative Profiling of Charged Particle Beams	1649487	07-Mar-2007	EP-Germany
18.	Device for Measuring and Quantitative Profiling of Charged Particle Beams	1649487	07-Mar-2007	EP-Denmark
19.	Device for Measuring and Quantitative Profiling of Charged Particle Beams	1649487	07-Mar-2007	EP-UK

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
20.	Apparatus and Method for Transport of Microscopic Object(s)	(1656680) DE60334252.3	15-Sep-2010	EP-Germany
21.	Apparatus and Method for Transport of Microscopic Object(s)	1656680	15-Sep-2010	EP-UK
22.	Apparatus and Method for Transport of Microscopic Object(s)	1656680	15-Sep-2010	EP-France
23.	Apparatus and Method for Transport of Microscopic Object(s)	1656680	15-Sep-2010	EP-Italy
24.	Apparatus and Method for Transport of Microscopic Object(s)	7502107 B2	10-Mar-2009	USA
25.	Calcium Potassium Ferric Amide Prophylactic Mixture Comprising this Compound and the Use thereof for Decorporation of Radiocesium in Subjects Affected by Nuclear Radiation	7935366 B2	06-Jan-2011	USA
26.	Calcium Potassium Ferric Amide Prophylactic Mixture Comprising this Compound and the Use thereof for Decorporation of Radiocesium in Subjects Affected by Nuclear Radiation	1838617	31-Jul-2013	EP-Belgium
27.	Calcium Potassium Ferric Amide Prophylactic Mixture Comprising this Compound and the Use thereof for Decorporation of Radiocesium in Subjects Affected by Nuclear Radiation	1838617	31-Jul-2013	EP-Germany
28.	Calcium Potassium Ferric Amide Prophylactic Mixture Comprising this Compound and the Use thereof for Decorporation of Radiocesium in Subjects Affected by Nuclear Radiation	1838617	31-Jul-2013	EP-France

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
29.	Calcium Potassium Ferric Amide Prophylactic Mixture Comprising this Compound and the Use thereof for Decorporation of Radiocesium in Subjects Affected by Nuclear Radiation	1838617	31-Jul-2013	EP-UK
30.	Calcium Potassium Ferric Amide Prophylactic Mixture Comprising this Compound and the Use thereof for Decorporation of Radiocesium in Subjects Affected by Nuclear Radiation	1838617	31-Jul-2013	EP-Sweden
31.	Calcium Potassium Ferric Amide Prophylactic Mixture Comprising this Compound and the Use thereof for Decorporation of Radiocesium in Subjects Affected by Nuclear Radiation	4885877	16-Dec-2011	Japan
32.	Fluorescence Correlation Microscope with Real Time Alignment Readout	1848983	27-Mar-2013	EP-UK
33.	Fluorescence Correlation Microscope with Real Time Alignment Readout	1848983	27-Mar-2013	EP-Germany
34.	Fluorescence Correlation Microscope with Real Time Alignment Readout	7705987	27-Apr-2010	USA
35.	Separation of No-Carrier-Added Thallium Radionuclides from No-Carrier-Added Lead & Mercury Radionuclides by Dialysis	1842207B1	03-Sep-2008	EP-UK
36.	Separation of No-Carrier-Added Thallium Radionuclides from No-Carrier-Added Lead & Mercury Radionuclides by Dialysis	1842207B1	03-Sep-2008	EP-Germany
37.	Separation of No-Carrier-Added Thallium Radionuclides from No-Carrier-Added Lead & Mercury Radionuclides by Dialysis	2592374	04-Jan-2011	Canada

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
38.	Separation of No-Carrier-Added Thallium Radionuclides from No-Carrier-Added Lead & Mercury Radionuclides by Dialysis	7799226	21-Sep-2010	USA
39.	A Novel Assay for Screening Anti-Psychotic Drugs	7524639	28-Apr-2009	USA
40.	A Novel Assay for Screening Anti-Psychotic Drugs	(1692503) 602004023418.4	30-Sep-2009	EP-Germany
41.	A Novel Assay for Screening Anti-Psychotic Drugs	1692503	30-Sep-2009	EP-UK
42.	A Novel Assay for Screening Anti-Psychotic Drugs	1692503	30-Sep-2009	EP-Italy
43.	A Novel Assay for Screening Anti-Psychotic Drugs	1692503	30-Sep-2009	EP-France
44.	A Novel Assay for Screening Anti-Psychotic Drugs	1692503	30-Sep-2009	EP-Sweden
45.	Emergency Leak Arresting Device for a Collared Pipe	2545993	26-Jun-2012	Canada
46.	Emergency Leak Arresting Device and Method for a Collared Pipe	10-1202131	09-Nov-2012	South Korea
47.	A Penetration Enhancing Flux Formulation for Tungsten Inert Gas (TIG) Welding of Austenitic Stainless Steel and its Application	GB 2446905	16-Feb-2011	UK
48.	A Penetration Enhancing Flux Formulation for Tungsten Inert Gas (TIG) Welding of Austenitic Stainless Steel and its Application	95076	11-Jul-2011	Ukraine
49.	A Penetration Enhancing Flux Formulation for Tungsten Inert Gas (TIG) Welding of Austenitic Stainless Steel and its Application	8097826	17-Jan-2012	USA
50.	A Method for Non-Intrusive on-line Detection of Turbine Blade Condition	9557210	31-Jan-2017	USA

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
51.	Single Stage Purification for Uranium Refining	2007356815	13-Dec-2012	Australia
52.	Single Stage Purification for Uranium Refining	2707460	20-Jan-2015	Canada
53.	Single Stage Purification for Uranium Refining	2010/01122	31-Aug-2012	South Africa
54.	Stabilised Natural Circulation System with Nano Particles	5555625	06-Jun-2014	Japan
55.	Non-Ionic, Porous, Solid Resin with Chemically Bonded Crown Ether	5297462	21-Jun-2013	Japan
56.	Non-Ionic, Porous, Solid Resin with Chemically Bonded Crown Ether	2205672	30-Apr-2014	EP-France
57.	A Process for Producing Body Centered Cubic (B2) Nickel Aluminide (NiAl) Coating of Controlled Thickness on Nickel-base Alloy Surfaces	2452791	10-Jun-2012	Russia
58.	A Method of Qualifying Niobium and/or Other Super Conducting Materials for Reliable Fabrication of Super Conducting Radio Frequency (SCRF) Cavities	2217736	27-Mar-2019	EP-France
59.	A Method of Qualifying Niobium and/or Other Super Conducting Materials for Reliable Fabrication of Super Conducting Radio Frequency (SCRF) Cavities	8673820	18-Mar-2014	USA
60.	A Hydraulic Micrometer System for Remote Measurement of Inside Diameter of Pipes and Tubes and a Method of such Measurement	2690491	06-Nov-2012	Canada
61.	A Hydraulic Micrometer System for Remote Measurement of Inside Diameter of Pipes and Tubes and a Method of such Measurement	8327556	11-Dec-2012	USA

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
62.	Development of a Very High Resistance to Sensitisation in Austenitic Stainless Steel through a Special Heat Treatment Resulting in Grain Boundary Microstructural Modification	2112237	13-Sep-2017	EP-France
63.	Development of a Very High Resistance to Sensitisation in Austenitic Stainless Steel through a Special Heat Treatment Resulting in Grain Boundary Microstructural Modification	2112237	13-Sep-2017	EP-Germany
64.	Development of a Very High Resistance to Sensitisation in Austenitic Stainless Steel through a Special Heat Treatment Resulting in Grain Boundary Microstructural Modification	2112237	13-Sep-2017	EP-Sweden
65.	An Innovative 'Cut-and-Feed' Operation for Enhancing the Performance of Ion-Exchange Chromatographic Separation	2274075	09-Sep-2015	EP-France
66.	An Innovative 'Cut-and-Feed' Operation for Enhancing the Performance of Ion-Exchange Chromatographic Separation	7976708B2	02-Jul-2011	USA
67.	Wash Solution Suitable for Use in Continuous Reprocessing of Nuclear Fuel and a System Thereof	5643745	07-Nov-2014	Japan
68.	Wash Solution Suitable for Use in Continuous Reprocessing of Nuclear Fuel and a System Thereof	2223305	16-Nov-2016	EP-France
69.	Colour Indicator Dosimeter for Measurement of Ionising Radiation	7884339	08-Feb-2011	USA
70.	A Polymer Composite for Extracting Cesium from Nuclear Waste and / or Other Inorganic Wastes / Solutions	8828532	09-Sep-2014	USA

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
71.	A Polymer Composite for Extracting Cesium from Nuclear Waste and / or Other Inorganic Wastes / Solutions	2451574	20-Mar-2019	EP-France
72.	Dialkyldiaza-Tetraalkyl Acetone Diamide Derivatives useful for the Separation of Trivalent Actinide from Lanthanide and Process for the Preparation Thereof	5497174	14-Mar-2014	Japan
73.	Dialkyldiaza-Tetraalkyl Acetone Diamide Derivatives useful for the Separation of Trivalent Actinide from Lanthanide and Process for the Preparation Thereof	8785691	01-Apr-2014	USA
74.	Dialkyldiaza-Tetraalkyl Acetone Diamide Derivatives useful for the Separation of Trivalent Actinide from Lanthanide and Process for the Preparation Thereof	201406100046200	23-Jun-2014	China
75.	Dialkyldiaza-Tetraalkyl Acetone Diamide Derivatives useful for the Separation of Trivalent Actinide from Lanthanide and Process for the Preparation Thereof	2459522	26-Jun-2013	EP-France
76.	Niobium based Super Conducting Radio Frequency (SCRF) Cavities Comprising Niobium Components Joined by Laser Welding	9352416	31-May-2016	USA
77.	Niobium based Super Conducting Radio Frequency (SCRF) Cavities Comprising Niobium Components Joined by Laser Welding	2496379	04-Jan-2017	EP-France
78.	Niobium based Super Conducting Radio Frequency (SCRF) Cavities Comprising Niobium Components Joined by Laser Welding	2496379	04-Jan-2017	EP-Germany



Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
79.	Niobium based Super Conducting Radio Frequency (SCRF) Cavities Comprising Niobium Components Joined by Laser Welding	2496379	04-Jan-2017	EP-Italy
80.	Niobium based Super Conducting Radio Frequency (SCRF) Cavities Comprising Niobium Components Joined by Laser Welding	5632924	17-Oct-2014	Japan
81.	A Flexible Magnetic Membrane based Actuation System and Devices Involving the Same	9579434	28-Feb-2017	USA
82.	A Flexible Magnetic Membrane based Actuation System and Devices Involving the Same	2542271	26-Feb-2014	EP-Germany
83.	A Flexible Magnetic Membrane based Actuation System and Devices Involving the Same	2542271	26-Feb-2014	EP-France
84.	A TBP Nitrate Solvent Extraction Process for Producing High Purity Nuclear Grade Rare Earth Metal Oxide	9174855	03-Nov-2015	USA
85.	A Dual-Purpose Atomic Device for Realising Atomic Frequency Standard and Magnetic Field Measurement	9097750	04-Aug-2015	USA
86.	A Method for Large-Scale Synthesis of Optically Stimulated Luminescence Grade Polycrystalline Ceramic Material	9523033	20-Dec-2016	USA
87.	Compact Pulse Transformer with Transmission Line Embodiment	10763034	01-Sep-2020	USA
88.	A Method and Equipment for Separating Non-Conducting and Non-Magnetic Minerals	2014/08875	25-Nov-2015	South Africa
89.	Device for Tuning SCRF Cavity	10524346	31-Dec-2019	USA

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
90.	A Method and Device for Tuning SCRF Cavity	6259913	15-Dec-2017	Japan
91.	A Method and Device for Tuning SCRF Cavity	3266285	16-May-2018	EP-France
92.	A Method and Device for Tuning SCRF Cavity	3266285	16-May-2018	EP-Germany
93.	A Method and Device for Tuning SCRF Cavity	3266285	16-May-2018	EP-Switzerland
94.	A Decentralized Information Flow Security Model for Multilevel Security and Privacy Domains	9507929	29-Nov-2016	USA
95.	A System, a Device and a Method for Passive Decay Heat Transport	3405958	27-Nov-2019	EP-France
96.	A System, a Device and a Method for Passive Decay Heat Transport	3405958	27-Nov-2019	EP-Germany
97.	System, a Device and a Method for Passive Decay Heat Transport	10607740	31-Mar-2020	USA
98.	A System, a Device and a Method for Passive Decay Heat Transport	6650935	23-Jan-2020	Japan
99.	Synthesis of Fibrous Nano-Silica Spheres with controlled Particle Size, Fibre Density, and Various Textural Properties	11242257	08-Feb-2022	USA
100.	A Method of Adjuvant Treatment with Chlorophyllin Containing Therapeutic Preparation including for Radioprotection of Normal Tissues during Radiation Therapy and Kit Thereof	10183026	22-Jan-2019	USA

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
101.	High Voltage DC Power Supply with Full Range 24 Pulsed Input and Ripple Free Output for RF Amplifiers	10027122	17-Jul-2018	USA
102.	A process for the Production of Thorium Phosphate	2937621	10-Oct-2023	Canada
103.	A process for the Production of Thorium Phosphate from Thorium Oxalate and recovery of Oxalic Acid	2016210678	05-Jan-2023	Australia
104.	Optical Rare-Earth Doped Fibre Long Period grating Based Ionizing Radiation Dose Sensor Device	10101467	16-Oct-2018	USA
105.	Method for Recovering Gold using Hollow-Fibre Membranes and Dispersion Based Back Extraction	2327202	23-Jul-2010	Spain
106.	Ceramic Filler, Method of preparing the Ceramic Filler and Applications as Resonator and Laminate thereof	9505902	29-Nov-2016	USA
107.	Process of Solvent Extraction for Separation of Rare Earth Elements (REEs) through Partial Reflux of Rare Earths in Solvent based on Separation Factor	10227676	12-Mar-2019	USA
108.	A Process for the Removal of <sup>99</sup> Tc from Liquid Intermediate Level Waste of Spent Fuel Reprocessing	6949852	27-Sep-2021	Japan
109.	A Process for the Removal of <sup>99</sup> Tc from Liquid Intermediate Level Waste of Spent Fuel Reprocessing	10553324	04-Feb-2020	USA
110.	A Process for the Removal of <sup>99</sup> Tc from Liquid Intermediate Level Waste of Spent Fuel Reprocessing	3417461	29-Jan-2020	EP-France

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
111.	A Process for the Removal of <sup>99</sup> Tc from Liquid Intermediate Level Waste of Spent Fuel Reprocessing	3417461	29-Jan-2020	EP-UK
112.	An improved Method of Manufacturing Actively Cooled Accelerator Grid with full penetration Weld Configuration	3424635	31-Aug-2022	EP-France
113.	An improved Method of Manufacturing Actively Cooled Accelerator Grid with full penetration Weld Configuration	3424635	31-Aug-2022	EP-Germany
114.	An improved Method of Manufacturing Actively Cooled Accelerator Grid with full penetration Weld Configuration	3424635	31-Aug-2022	EP-Italy
115.	Method of Manufacturing Actively Cooled Accelerator Grid with Full Penetration Weld Configuration	10480863	19-Nov-2019	USA
116.	An Improved Laser Welding Method for Enhanced Weld Quality and Enhanced Surface Smoothness	1,21,09,649	<b>08-Oct-2024</b>	USA
117.	A liquid Nitrogen Based Portable Refrigeration System for Carrying Refrigerated Goods	ZL201810504018.3	29-May-2022	China
118.	A Method of Manufacturing Radio Frequency (RF) Coil Multi-Driven RF based Negative Ion Source	11014187	25-May-2021	USA
119.	A Method of Manufacturing Radio Frequency (RF) Coil Multi-Driven RF based Negative Ion Source	3553797	20-Apr-2022	EP-France
120.	A Method of Manufacturing Radio Frequency (RF) Coil Multi-Driven RF based Negative Ion Source	602018034024.6	20-Apr-2022	EP-Germany

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
121.	A Method of Manufacturing Radio Frequency (RF) Coil Multi-Driven RF based Negative Ion Source	502022000045568	20-Apr-2022	EP-Italy
122.	Human Neural Precursor Cells with Inducible <i>STIM1</i> Knockdown	11851676	26-Dec-2023	USA
123.	Method and Electronic Device for Providing Image-Based CAPTCHA Challenge	10949523	16-Mar-2021	USA
124.	Displacement Decoupling Arrangement for Piping Systems	3604713	24-Feb-2021	EP-France
125.	Displacement Decoupling Arrangement for Piping Systems	3604713	24-Feb-2021	EP-Germany
126.	Displacement Decoupling Arrangement for Piping Systems	3604713	24-Feb-2021	EP-Italy
127.	Displacement Decoupling Arrangement for Piping Systems	3604713	24-Feb-2021	EP-Switzerland
128.	Displacement Decoupling Arrangement for Piping Systems	10738914	11-Aug-2020	USA
129.	Production of Dilute Pb (0.2 to 1.1 wt %) - Li Alloys	3841231	17-Aug-2022	EP-France
130.	Production of Dilute Pb (0.2 to 1.1 wt %) - Li Alloys	3841231	17-Aug-2022	EP-Germany
131.	Diffusion Bonding of Piezoelectric Crystal to Metal Wear Plate	3948967	19-Apr-2023	EP-France
132.	Diffusion Bonding of Piezoelectric Crystal to Metal Wear Plate	3948967	19-Apr-2023	EP-UK

Sr. No.	Title of the Invention	Patent No.	Grant Date	Application Country
133.	Use of Jack Bean Lectin for increasing the Abundance of Hematopoietic Stem Cells and Progenitor Cells in Bone Marrow and/or Epidermal Stem Cells in Skin in vivo	10918695	16-Feb-2021	USA
134.	A Novel Versatile Phoswich Detector consisting of two Single Crystals to discriminate various kinds of Radiations	10942283	09-Mar-2021	USA
135.	Use of 3,3'-Di-Seleno-Dipropionic Acid (DSePA) as an Anti-Cancer Agent	11213499	04-Jan-2022	USA
136.	Inductively Driven Pellet Accelerator and Injector	4086920	10-Jul-2024	EP-France
137.	Inductively Driven Pellet Accelerator and Injector	4086920	10-Jul-2024	EP-UK
138.	Annular Centrifugal Extractor with Solid Separation Part to Separate Solid Particles Present in Solvent Extraction Fluid and A Process for the Same	7579966	30-Oct-24	Japan
139.	Compact Hydraulic Pinned Jaw Crusher System with High Size Reduction Ratio	2021103279	26-Sep-2024	Australia

**Table 3. State wise release of Trombay crop varieties**

States	Trombay Varieties Released for Commercial Cultivation
Andhra Pradesh	Mungbean (TM-96-2, TARM-1), Blackgram (TU-40, TU-94-2), Rice (Hari), Groundnut (TG-47 (RARS Tl), TPG-41)
Bihar	Mungbean (TMB-37), Groundnut (TG-51, TG-37A, TPG-41, TG-38, TG-22), Linseed (TL 99)
Chhattisgarh	Mungbean (TM2000-2), Pigeonpea (TJT-501, TT-401), Cowpea (TRC77-4), Rice (TCVM, TCSM, CSJT, Vikram -TCR, TCDM-1, CTLM, Sanjeevani), Groundnut (TPG-41, TG-88)
Gujarat	Mungbean (TARM-1), Pigeonpea (TJT-501, TT-401, TT-6), Cowpea (TC-901), Groundnut (GG-37, TG-37 A, TG-26, TPG-41, Somnath (TGS-1), TG-1)
Haryana	Groundnut (TG-37 A, TPG-41)
Himachal Pradesh	Mustard (THPM-1)
Jharkhand	Mungbean (TMB-37), Mustard (BBM-1), Linseed (TL-99)
Karnataka	Mungbean (TRCRM-147, TARM-1), Blackgram (TRCRU-22, TU-40, TU-94-2), Pigeonpea (TT-6), Sorghum (TRJPI-5), Groundnut (TDG-39, TPG-41, TAG-24)
Kerala	Mungbean (TARM-1), Blackgram (TU-94-2), TT-6, Groundnut (TG-3)
Madhya Pradesh	Mungbean (TJM-3, TARM-1), Pigeonpea (TJT-501, TT-401, TT-6), Cowpea (TC-901), Groundnut (TPG-41), Blackgram (TJU-130, TJU-339, TPU-4), Wheat (TRVW-155)
Maharashtra	Mungbean (TARM-18, TARM-1, TARM-2, TAP-7), Blackgram (TAU-2, TPU-4, TAU-1), Pigeonpea (PKV-TARA, TJT -501, TT-401, TAT -10, TT-6), Rice (TKR-Kolam, BARCKKV16), Sorghum (TAKPS-5), Groundnut (TAG-73, TLG-45, TKG -19A, TAG-24, TG-17, TG-1), Soybean (TAMS 98-21, TAMS-38)J Mustard (TAM-108-1, TPM-1), Sunflower (TAS-82 ), Sesame (TLT-10)
N-E States	Assam: Mungbean (TMB-37), Groundnut (TG-51, TG-38, TG-37A, TPG-41), Mustard (TM-2, TM-4), Linseed (TL-99)
	Nagaland: Groundnut (TG-51, TG-38, TG-37 A, TPG-41), Linseed (TL-99)
	Rest of NER: Groundnut (TG-51, TG-38, TG-37 A, TPG-41)
Odisha	Mungbean (TARM-1), Blackgram (TU-40), Groundnut (TG-51, TG-38, TG-37 A, TAG-24), Jute (TKJ-40)
Punjab	Mungbean (TM B-37), Groundnut (TG-37 A, TPG-41), Mustard (TJM2)
Rajasthan	Cowpea (TC-901), Groundnut (TBG-39, TG-37 A, TAG-24, TPG-41) , wheat (TJW153)
Tamil Nadu	Mungbean (TARM-1), Blackgram (TU-40, TU-94-2), Groundnut (TPG-41)
Telangana	Mungbean (TARM-1), Blackgram (TU-40), Pigeon pea (TT-6), Rice (Hari)
Uttarakhand	Cowpea (TC-901), Groundnut (TPG-41)
Utta Pradesh	Mungbean (TMB-37), Groundnut (TG-37A), Linseed (TL-99)
West Bengal	Mungbean (TMB-37), Cowpea (TC-901), Groundnut (TG-51, TG-38, TG-37A, TAG-24), Mustard (TBM-143, TBM-204), Linseed (TL-99)