GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF SCIENCE & TECHNOLOGY
(https://dst.gov.in)

Call for Project Proposals under Technology Development Programme (TDP)

The Department of Science & Technology (DST) plays a pivotal role in promotion of science & technology in the country. The Department has wide ranging activities ranging from promoting high end basic research and development of cutting-edge technologies on one hand to service the technological requirements of the common man through development of appropriate skills and technologies on the other. Through an umbrella scheme of Innovation Technology Development and Deployment, the Department under its Technology Development Programme (TDP) has been promoting and supporting activities related to indigenous development of innovative technologies in identified areas. During recent past, DST has supported the development of technologies at various R&D laboratories/ institutions. This has resulted in development and deployment of technologies.

One of the key objectives of the Department of Science & Technology is to promote technology development in various fields. The Department has been supporting Technology development projects which include materials, devices and processes. The Programme supports activities aimed at developing technologies both in the advanced/emerging areas and in traditional sectors/areas. Under the Programme, feasibility of fresh ideas/ concepts is also assessed for their potential conversion into useful technology/product.

A New Call for Proposal is planned to invite proposals from scientists/engineers/technologists working in academic institutions/R&D institutions/laboratories having adequate infrastructure/ facilities to carry out Technology Development work/prototype building. Financial support will be provided for indigenous development of innovative technologies in identified areas.

DST invites R & D proposals in the following areas for financial support:

1. Advanced Manufacturing Technologies (AMT)
2. Waste Management Technologies (WMT)
3. Biomedical Device and Technology Development Programme (BDTD)
4. Technology Development Programme (TDP)
5. Therapeutic Chemicals (TC)

Eligibility criteria:

1. Proposals must be submitted using **ONLINE portal (https://onlinedst.gov.in/)** only by Scientists/Engineers/ Technologists working in Universities and other Academic institutions; R&D institutions/ Laboratories having adequate infrastructure and facilities to carry out R&D work. PIs may submit the proposal under the division of "Technology Development and Transfer" after registration on portal or using their already registered IDs.
2. The project proposal will be reviewed only if the PI has completed proof of concept. The proposals falling under TRL 3 to 6 [TRL 3 – Experimental proof of concept, TRL 4 – Technology validation in lab, TRL 5– Technology validation in relevant environment, TRL 6 – Technology demonstrated in relevant environment] are only to be submitted. The fundamental R&D proposals will not be supported under this call.
3. It is mandatory to **demonstrate lab prototype** to become eligible for consideration under this call.

4. The PI or groups already having ongoing projects under any of the AMT, WMT, BDTD, TDP, and TC programs of DST may apply only if six months or less are due for the completion of the project.
5. For submitting application under the program area of Biomedical Device and Technology Development Programme (BDTD), a clinician should be involved with investigating team as Co-PI.

POINTS TO BE KEPT IN MIND WHILE SUBMITTING PROJECT PROPOSALS

1. Financial support is provided only for temporary staff salaries, equipment (if necessary, and not available with PI's Institute, and specific to project requirement), consumables, domestic travel and other miscellaneous items. **No support is provided towards basic infrastructure, buildings and International travel**.
2. The investigators/ R&D Group must have adequate experience and expertise in the relevant area of proposal. The proposals should be based on innovative technologies/ ideas. Proposals should have specific, concrete, quantifiable objectives/deliverables. Results of ongoing and completed projects of the PI must be reflected while the formulating new proposals.
3. Co-PI from host institute is mandatory.
4. The technology demonstration plan should be clearly spelled out with achievable milestones, timelines, justifiable budget requirement, and engagement with prospective technology transfer partners or technology transfer facilitating bodies.
5. It is envisaged that the end product of development shall be transferred to industries/suitable stakeholders for technology implementation. Hence, project should be proposed with appropriate industry/suitable stakeholder participation, clearly stating the technical as well as financial terms of participation.
6. No financial support will be provided to industry. An endorsement letter from the participating industry/stakeholder with a detailed breakup of their contribution for the proposed project has to be submitted.
7. **Fund support under non-recurring grant for the required equipment will be given only if the same or similar facility is not available in the PI's institution or nearby institutions**.
8. A PI can submit only one proposal against this DST-TDP Call. Submission of more than one proposal from a PI would be liable for disqualification.
9. It is desirable to have the contribution of the host institution/grantee institution for the capital cost of the project.
10. The quarterly deliverables should be clearly mentioned in the proposal in the form of a Gantt chart/ matrix.
11. The projects should be time-bound normally for duration of 2-3 years depending upon the device/technology to be developed.
12. Implementation of the projects will be monitored regularly through Progress Reports, Audited Financial Statements and Committee of Experts in Group review meetings and onsite review as well.
13. **The CoEs will be supported for period of five years**. The Centers will be evaluated after three years for continuity and will be further extended for two years depending upon their performance.
14. **Maximum two CoEs will be established under each thrust area**. CoE should be multi-institutional and collate the strength of partner institutes. Industry(ies) participation and contribution is mandatory for CoE applications.
15. Interested Institutes may submit the concept note/ full proposal of CoE within the duration of the call.

For any queries related to this call, please feel free to write to

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Last Date and Time of Submission: 30.06.2023, 5.00 P.M

(Note: Please complete the online submission of proposal well in advance to avoid last day rush)

Project Proposals are invited under the following categories/Thrust areas:

<u>Advanced Manufacturing Technologies (AMT)</u>:

All the technologies proposed in the project should be at lab/ pilot scale and should have proper authenticated data to claim the proof of concept.

S.NO	Thrust area	Proposals invited for
1	**Surface Engineering**	1. Development of novel Si-B-C-N-based (including diamond composite) super hard thin films on metallic and ceramic machining tools and machining tool bits. The hardness of the films should be at least 60 GPa. The toughness of the films should facilitate the intended proposed cutting/machining/drilling operations. Proposals should be strictly based on the preliminary work (at TRL 3 or 4) on planar substrates and test coupons.
		2. Development of carbide thin films as a replacement for hard chrome plating (not traditional chrome plating). The benchmark values (of surface hardness, corrosion resistance, operating temperature, surface roughness/coefficient of friction, area of deposition, conformality, wear rate, etc.,) of hard chrome plating for the identified application must be achieved. Identification of the end application should be explicitly needed because the application shall give the benchmark values.
		3. Development of novel self-lubricating solid surfaces with a coefficient of friction less than 0.1, sliding distance of at least 3 m, and a wear rate in the range of 1E-4-4E-5 mm^3/Nm. Development here means either developing novel and sustainable processing strategies to prepare known self-lubricating surfaces or the preparation of novel self-lubricating surfaces using existing processing strategies to achieve the above-mentioned benchmark values (TRL4-6).
		4. Device-level manufacturing/fabrication and validation of thin film-based sensors such as pressure sensors, strain sensors, temperature sensors, magnetic field sensors, etc. The proposals on preparing and measuring the sensing materials' characteristics are strictly discouraged.
		5. Development of protective coatings/thin films (against mainly hydrogen embrittlement) on the inner surfaces of natural gas pipelines in the event of changing to green hydrogen technologies (TRL 3-4).
		6. Development of laser shock peening of super alloys and components made of super alloys (TRL 3-4).
2	**Precision Manufacturing of Small yet Critical Components**	1. Manufacturing of support components for high-end instruments 2. Examples: TEM holders, MEMS based local heaters, liquid cells, mechanical testing systems, etc.
		3. To develop and demonstrate technology at lab/pilot scale for manufacturing various types of DC Motors.

Waste Management Technologies (WMT):

All the technologies proposed in the project should be at lab/ pilot scale, should have proper authenticated data to claim the proof of concept, should follow circular economy approach and address the sustainability.

S.NO	Theme	Proposals invited for
1	**Industrial Waste**	1. To develop and demonstrate technology at lab/pilot scale for Import Substitute Products in manufacturing wrought aluminium products (Sheets & Plates) from secondary aluminium recycled from scraps.
		2. To develop and demonstrate a safe and environment friendly technology at lab/pilot scale for the recycling of nonferrous scrap such as scrap of zinc, copper, magnesium, titanium, nickel, etc. and dross.
		3. To develop and demonstrate technologies for bulk volume utilization of Red Mud including extraction of Iron, Titanium, Aluminium, Silica, Rare Earth Metals like Scandium, Cerium, Lanthanum, etc.
		4. To develop and demonstrate technology for holistic utilization of tailings and metallurgical slags including recovery of valuables minerals and metals such as quartz, rare earth metals, precious metals, etc.
2	**Toxic and Hazardous Industrial Waste**	1. Chemical sludge from Textile sector: Utilization of chemical sludge as energy resource: Production of Biochar/Briquettes etc.; To develop and demonstrate a pilot scale (TRL 5) technology at 0.5 to 1 MT scale with Industry collaboration (Demo at Industry premises).
		2. Chemical sludge from Dye and Dye Intermediate Manufacturing sector: Stabilization/Solidification of ETP sludge of Dye & Dye intermediate for use as building material: To develop and demonstrate a pilot scale (TRL 5) technology at 0.5 to 2 MT scale with Industry collaboration (Demo at Industry premises).
		3. Pharmaceutical residue: utilization of sludge and residue.
		4. Spent pot lining generated from Aluminium smelters: (a) Utilization of carbon portion of spent pot lining as energy source; To develop and demonstrate a pilot scale (TRL 5) technology at 1 to 5 MT scale with Industry collaboration (Demo at Industry premises) (b) Utilization of refractory portion of spent pot lining; To develop and demonstrate a pilot scale (TRL 5) technology at 1 to 5 MT scale with Industry collaboration (Demo at Industry premises).
		5. Concentration and Evaporation residue: (a) Recovery of salt in cost effective manner from Textile, Tannery, Dye and Dye intermediates, Pharmaceutical industry Multi Effective Evaporator (MEE) residue (b) Characteristics of MEE residue and methods of ultimate disposal for non-recoverable materials.
3	**Technologies and Products from Agriculture Residues**	1. High volume throughput machines for fibre extraction from agricultural waste.
		2. Novel materials for sustainable packaging from agriculture residues.
		3. Extraction of PLA from agriculture residues.
		4. Extraction of novel materials for 3d printing from agriculture residues.

Biomedical Device and Technology Development (BDTD):

S.NO	Theme	Proposals invited for
1	**Healthcare and Medical Wearable Sensors /Devices**	1. Point of care devices for monitoring blood analytes, (heart health monitoring : trop I, Creatinine Kinase, CKMB, etc.).
		2. Wearable sensors for cardiac biomarkers - Troponin for heart attacks, BNP for heart failure.
		3. Remote monitoring devices of cardiac arrythmia detection, Monitoring for lung congestion (infrared / acoustics) in heart failure to predict clinical worsening and prevent readmissions.
2	**Portable Medical Imaging**	1. Portable medical imaging instruments / devices for remote site applications: Optical imaging, NIR imaging, Optical coherence tomography.
		2. Development of GENERIC Multi-channel SoC which can be used in Low power, low weight EEG, ECG, EMG machines. Involves design, fabrication and testing of SoC. and then integrating in EEG, EMG, ECG machines.
3	**Medical Device Development**	1. Cardiopulmonary rehabilitation devices.
		2. Wired or wireless 16/32 channel EEG Headset with AI capabilities.
		3. Multichannel fNIRs (Functional Near Infrared Spectroscopy) system for screening and diagnosis of neurological disorders.
		4. Devices for prediction of exacerbations of heart failure or COPD.
		5. Design and development of indigenous portable cardiac biosensor to diagnose and predict cardiac arrest.
4	**Bio Inspired Technological Solutions and Wound Care Technologies**	1. Bio adhesives, Adhesive solutions, staples, locking films.
		2. Hemostatic agents, devices, and technologies for diabetic wounds, monitoring prognosis, Trauma bleeding control products.
5	**Women and Child Health Care Devices**	1. Innovative products in menstrual Hygiene, devices for post-partum hemorrage.
		2. Continuous high risk pregnancy monitoring point of care device.
		3. Design and development of indigenous intrapartum device with multiple sensors for precise monitoring.

Technology Development Programme (TDP):

S.NO	Theme	Proposals invited for
1	**Advanced Materials and Processing**	1. Development of powders for coating applications.
		2. Development of Technology for Low-cost, high-quality Graphene from Indian mineral resources and 2d materials production for industry applications.
		3. Development of Electrically conductive 3D printable materials, Flexible part 3D printing, Metal 3D printing using wire material by Induction Heating.
		4. Bulk synthesis of advanced functional materials including Rare earths, High-performance Permanent Magnets Components using AM Techniques, Development of rare earth-free magnets, Recycling of rare earth permanent magnets.
		5. Development of materials for high-temperature applications.
		6. Development of formable structural ceramics and operational- ceramic waveguides and antennas for 5G–Sub6GHz communication applications.

2	**Agro Tech and Food Processing**	1. Development of Sensors and Automation in on field application post-harvest technology.
		2. Food processing and preservation for reduction in post-harvest losses, Food quality and safety (non-destructive evaluation, instrumentation, packaging, waste to wealth , etc.).
		3. Development of Technologies for prevention of wild-animal related losses to agricultural fields.
		4. Development of Technologies for horticulture and millet mechanization.
		5. Development of Advanced technology for storage systems: Seed Storage, Solar based cost effective storage systems.
3	**Construction/ Infrastructure and Low-cost Building Materials**	1. Structure Health Monitoring: Indigenous technology for Smart embedded sensing for continuous health monitoring of structures.
		2. Automation in construction such as 3D printing, for improving construction productivity, Hybrid Steel Construction, Composite bridge construction, Interlocking block masonry technology, Carbon capture in concrete, Indigenous adaptive control devices for seismic response reduction.
		3. Development of Composite rebar for RC structures / civil infrastructure, Deployable structures, Infrastructure: Smart building materials, Building energy efficiency improvement.
4	**Spectroscopy/Sensors /Devices/ Environmental Technology Solutions**	1. Development of devices and systems for natural calamity forecasting/detection and handling applications.
		2. Development of portable spectroscopy technique for evaluating pesticide content in fruits, vegetables, and meat products and other applications.
		3. Development of Technologies for soil erosion prevention and soil health restoration in hill ecosystems.

CoE Proposals are invited under the following categories/Thrust areas:

Applications are invited to create CoE from Scientist/Engineers/ Technologists working in Universities, Academic institutions, R&D institutions, laboratories in association with Other Institutes, Laboratories and with mandatory contribution from Industry/ Industry bodies. CoE should target capacity building along with 4Ds (design, development, demonstration, and deployment) of following technologies.

Advanced Manufacturing Technologies (AMT): -

S.NO	Theme	Proposals invited for
1	**Creation of Centre of Excellence (CoE) on Sustainable Technologies for Bulk Chemicals**	Sustainable Technologies for Bulk chemicals from fossil fuels including petroleum. The proposed process should confine to net zero principles. The end deliverable should be pilot plant process.

Waste Management Technologies (WMT): -

S.NO	Theme	Proposals invited for
1	**Creation of Centre of Excellence (CoE) in the Domain of Agricultural Waste Management**	Technologies in the management of Agricultural waste viz., Post-harvest agro residue and lignocellulosic biomass e.g. straws, stalks, etc., Flower waste, Fruits and vegetable waste, Primary processing waste, Cereals, pulses, legumes and millets waste.

Biomedical Device and Technology Development (BDTD): -

S.NO	Theme	Proposals invited for
1	**Creation of Centre of Excellence (CoE) for Medical Device Development**	Medical device development from TRL 4-6, testing & validation covering 6-8 medical devices.

Technology Development Programme (TDP): -

S.NO	Theme	Proposals invited for
1	**Creation of Centre of Excellence (CoE) for Validation of Agro Technologies***	Validation of agro technologies developed through DST supported projects.

Therapeutic Chemicals (TC): -

S.NO	Theme	Proposals invited on AMR for
1	**Creation of Centre of Excellence (CoE) on Antimicrobial resistance (AMR)**	1. Multipronged approaches focused on "Leads to Pre-clinical studies with I.P. potential". 2. New formulations of existing antibiotics. 3. Pathogen microbiology including focus on host derived targets and therapies. 4. Diagnostics, devices and the scope of development of POC devices for clinical settings.

Note: Maximum two CoEs will be established under each thrust area.

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