सत्यमेव जयते

Ministry of Textiles

Government of India
Ministry of Textiles
National Technical Textiles Mission

Invitation of Proposals for Research Projects

Ministry of Textiles, under the National Technical Textiles Mission (NTTM), is inviting proposals for Research Projects from reputed government institutes and research organizations. Details of identified Research topics and the General guidelines are available on the official website of Ministry of Textiles (http://texmin.nic.in/technical-textiles-mission).

The organizations/institutions proposing research projects are highly encouraged to partner with Industry for further commercial development of the research outcomes.

For further details, Dr. Mukesh Kumar Sinha, Joint Mission Director (Research and Innovation), Mission Directorate, NTTM may be contacted at m.ksinha@nic.in; nttm-textiles@nic.in

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Research Topics Identified for Inviting Research Proposals under NTTM

A. Specialty Fiber & Composites

1. High molecular weight/ High strength polyethylene fibers

1.1 Composites of fibers thereof for focused applications
1.2 Development of armours
1.3 Development of parachute material
1.4 Solid state processed DPE tapes and gel spun ultra-high-molecular-weight polyethylene Fibers
1.5 Development of bullet proof material thereof
1.6 Surface modifications thereof, application of Graphene, functional layers, etc. process optimization for production of such fibers. Graphene incorporated fibers are useful for antistatic and antimicrobial applications.
1.7 Development and manufacture of nano-fabrics for respiratory masks etc.
1.8 Development of helmets
1.9 Precursor polymer development
1.10 Carbon fibers produced from Carbon nanotube (CNT) reinforced acrylic precursors.

2. Acrylic fibers

2.1 Development of improved process of polymerization –polymers with narrow molecular weight distribution/ poly dispersity index (PDI) for better fiber spinning and improved properties.
2.2 Development of fibers from acrylonitrile
2.3 Manufacture of standard modulus grade carbon fiber
2.4 Development of intermediate grade carbon fiber

3. Carbon fiber from coal tar/ petroleum pitch

3.1 Coal tar pitch to green fiber
3.2 Petroleum pitch to green fiber
3.3 Conversion of green fiber to carbon fiber

4. Glass Fibers

4.1 Development of improved reinforced glass fiber products
4.2 Technology for making low-cost reinforced glass fibers by way of reducing thickness of layers
4.3 Glass fibers and hybrids for light-weighting of automobile
4.4 Thermal insulation of reinforced glass fiber by way of nano-surface medication

4.5 Surface modification of reinforced glass fibers, TEFLON coating, etc, for Radome and telecommunication systems.

5. Surface modifications of Carbon Fiber

5.1 Functional fibers- low volume, high value fibers
5.2 Development of nanofibers
5.3 Application of Graphene
5.4 Nano material surface coating for thermal and other applications
5.5 Activated carbon fibers (for energy storage- battery electrodes etc)
5.6 Activated nano fabrics for medical, hygine and other applications
5.7 Camouflage fiber development for military use
5.8 UV protected fibers
5.9 Surface modifications for other medical applications

6. Scaling up of electro-spinning process for nano-fibers
7. Development and manufacture of specific hybrid fibers, including Carbon – Glass fibers
8. Development and manufacture of Aramid Fiber.

B. Geotechnical Textiles

1. Pavement material and execution methodology – for different types of roads based on vital physical and environmental parameters. Indigenous materials/ Use of waste materials preferred.
2. Landslide prevention, slope protection using geo-textiles including jute/coir/natural fiber.
3. Railway sub-ballast/ sub- structure strengthening using geo-textiles. Research may include cost- economic materials development for different loading parameters and different sub track parameters (earthwork formation, via-duct, high speed, light rail etc.)
4. Landfills – use of geo-textiles
5. Water infrastructure – soil erosion prevention
6. Water Conservation – seepage prevention
7. Water Infrastructure – development of fiber based high pressure/ heavy duty pipelines.
8. Development of geo-grids/geo-composites from high strength polymer
9. Simulated/ Accelerated impact study of use of geo-textiles in infrastructure projects
10. Geo-textiles for extreme climates (heavy rainfall, extreme temperatures, snow laden pathways, loose soil infrastructure etc.)
11. Any other research topic of relevance.

C. Agro Technical Textiles

1. Development of cost effective/economic long lasting agro-textiles. Development of inherent fiber for withstanding ultra-violet, moisture and other environmental conditions.
2. Tailor-made agro-textiles to suit different crops and different climatic conditions (Indian Standard also need to be developed to be specific to suit applications)
3. Agro-textiles for sericulture applications
4. Agro-Textiles for protection of crops from wildlife attacks in Himalayan and mountainous areas.
5. Agro-textiles for perennial crops (like tea, coffee, spices, mulberry etc)
6. Long lasting mulching material
7. Seed protection bags
8. Packaging of agro-products by use of natural fiber based agro-textiles.
9. Artificial soil/ soil-less farming through agro-textiles
10. Development of agro-textiles for poly-house climatic control
11. Any other research topic of relevance.

D. Development of High performance fibers

1. Ultrahigh-Molecular-Weight Polyethylene (UHMWPE)
2. Aramid (meta & para) fibers
3. Mod-acrylic fibers
4. Polyphenylene sulfide (PPS) fiber
5. Bi-component fiber/ tow for all types of cross sections & polymers
6. Conductive fiber
7. Poly tetra fluoro ethylene (PTFE) coated fiber
8. Development of high performance poly-ethylene (HPPE) fiber from natural and eco-friendly compounds
9. Re-engineered technical yarns
10. Upgradation of jute fiber to replace costly hemp & flax fibers
11. PAN-based High Performance Specific Carbon Fiber Development

E. Sportech

1. Phase-changing material (PCM) applications in active wears
2. Sustainable environmentally friendly sportswear for various applications
3. Composites for sports goods like hockey sticks, tennis rackets, badminton rackets, Golf shafts, fishing rods etc.
4. Development of Artificial turfs

F. Meditech

1. Development of sustainable bio-based sanitary products
2. Development of Antistatic Fabrics
3. Development of technology to store/use heat energy released during incineration of meditech products
4. Good Quality Wood Pulp – Absorbent Fiber Material for Hygiene Products

G. Mobiltech

1. Design & development of high efficiency nonwoven air filtration
2. Technology of manufacturing light weight, cheaper, natural fiber and agro-waste based fiber reinforced composite components for automotive
3. Development of Carbon fiber bike frames
4. Products related to Safety regulations – Airbags

H. Biodegradable technical textiles

1. Development of biodegradable polymer
2. Research on modifications required in existing machinery infrastructure in order to use it with new renewable raw materials
3. Systems and processes for recyclability aspect of technical textiles

I. Protech

1. Development of IRR (Infrared Reflector) camouflage customized to Indian Terrain.
2. Formulation of chemicals to impart FR properties to fabrics composed of 100% Cotton, Cotton Polyester, Cotton Nylon blends.
3. Indian Firefighting Suits with Global standards
4. Availability of Thermoregulatory Fiber technology
5. Auxetic 2D and 3D Woven Textiles and their composites

J. High performance composites fabrics for cement reinforcement

1. Non-corrosive textile reinforcements in concrete
2. Boats from fiber reinforced polymers for various water taxi projects of GOI
3. Geo-bags and geo-tubes for coastal protection and disaster management
4. Research on the various types of fibers and its manufacturing process (Fiber braiding, 3D weaving, filament winding) for fiber resin based composite applications

K. Plasma technology in technical textiles

1. An Application of plasma technology in technical textiles

L. Miscellaneous textiles Items

1. Development of Buildtech/ Geotech textiles for Marine and Waterways Applications
2. Research on production of high-pressure Hydrogen storage tanks
3. Advanced topics covering specialty fibers need for strategic applications
4. Substitutes of plastics and metals with suitable Technical Textiles materials, particularly in those areas where it is possible to reduce imports and develop eco-friendly Technical Textiles products.

Annexure-II

National Technical Textiles Mission

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General Guidelines for submission of Research Proposals under Component-I (Research, Innovation and Development) and Terms of Funding

National Technical Textiles Mission is valid for the period 2020-21 to 2023-24, after which it will move into the sunset phase. All research objectives approved for National Technical Textiles Mission have defined target years which are 2021-22 for fundamental research at fibre level and 2022-23 for application and product developments. The Research Proposals must be submitted keeping in mind the target years of the Mission, so that the Desired Outcome of each research activity is available within the target year.

A: Mechanism for submission of Research Proposals from Research Bodies

A-1. A **'Research Body'** under National Technical Textiles Mission is Research Organisation, which is directly under the control of a Ministry/ Department of the Government of India, or an academic Institution of repute engaged in advanced research in the relevant field.

The Research Body may undertake the approved research activity entirely on its own, or involve partners from Industry or other research bodies. In case of an **'Industry Partner'** or multiple Industry Partners, the Industry Partner must have its manufacturing facility in India for a related product and must have adequate research infrastructure in India for undertaking research in the related field. The Research Body may also partner with other **'Laboratory Partner**(s)' who also must have adequate research infrastructure in the related field in India. The details of Industry/ Laboratory Partners have to be brought out in the research proposal with details of their specific roles in the Research Proposal. All Industry/Laboratory Partners must be registered in India under the relevant legal provisions.

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Funding will be provided to the Research Body only, and the Research Body conducting the particular research project is primarily responsible for all inter-partnership coordination, distribution of funds, monitoring of expenditure and reporting progress to the Government. The Research Body is also responsible for the final Desired Outcome in the time bound manner.

A-4. The funding provided under National Technical Textiles Mission (Component-I) will not cover any cost towards additional infrastructure such as building or any renovation work. The research activities have to be undertaken within the available infrastructure arrangement of each participating organisation. However, research equipments which are additionally required for specific jobs not available earlier may be procured by the 'Research Body' the details of which needs to be clearly indicated in the Research Proposal submitted for consideration of the Government. As far as possible, common test facilities may be utilized where testing of such nature are not frequently necessary, so as not to create redundancy in testing infrastructure.

Ministry of Textiles is contemplating to create an integrated Testing & Certification Centre for Advanced Technical Textiles in association with the Government of Telangana. The facilities set up in this Centre may be utilized for advanced testing.

A-5. Cost incurred towards permanent manpower should not be charged to the cost of research. However, cost of additional temporary manpower (contract employee, consultants) proposed to be engaged for the **'Research Project'** may be indicated clearly in the research Proposal, with details of man-days and cost per man-day in respect of each such engagement.

A-6. Each Project will have maximum three **Stages** (including the final outcome stage), towards achievement of its **'Desired Outcome'**. The Desired Outcome must be in clearly identifiable terms, which has a potential for commercial use or towards an application of substantial improvement.

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The Research Proposal must indicate all such serial and parallel activities; and also indicate activities to be performed by the 'Research Body' and its Industry Partner/Laboratory Partner in colour code in the PERT diagram. The timeline for each activity leading to a milestone and the Stage (a Stage means achievement of a measurable and definable outcome prior to the Desired Outcome) also needs to be defined in the Research Proposal. Each Project will be reviewed periodically not exceeding once every six months to monitor progress, vis-a-vis its defined milestones and Stages. Further funding will depend upon satisfactory progress of the Research Project in terms of the approved plan.

A-7. The Research Proposals will be approved as per the Institutional Mechanism under National Technical Textiles Mission, notified in the Gazette of India vide Gazette Resolution Dated 17th March 2020. The Research Body submitting the Research Proposal and its Partners may be required to present the proposal before the Committee (s) at the time of its consideration.

A-8 National Technical Textiles Mission aims at research in niche areas of technology for boosting indigenous manufacturing and exports of value added and cutting edge technical textiles materials and products. All research projects have to be original in nature addressing a niche and advanced area of Technical Textiles having wider benefit to the country. The Research Body and its Partners for the Research Project are responsible for the protection of research confidentiality.

B: Funding Arrangement

(i) 20% release of funds after approval of the Research Proposal and awarding of the Research Project and signing of Agreement/ MoU;

(ii) 30% release of funds after Stage-I achievement of the Research Project and approval thereof, and utilization of minimum 70% of 1st installment;

(iii) 30% release of funds after Stage-II achievement and approval thereof and utilization of 100% funds of 1st installment and minimum 70 % funds of

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2nd installment;

(iv) 20% final release of funds after achievement of the Desired Outcome and utilization of 100% funds of 1st, 2nd & 3rd installment released:

The scheme shall be implemented through a 3-tier institutional mechanism viz:-

(i) Mission Steering Group

(ii) Empowered Programme Committee

(iii) Committee on Technical Textiles on Research, Development & Innovation

All the research equipments, additional contract manpower / consultants, procurement of research materials shall be purchased / hired keeping in view the relevant instructions of GFR 2017 and guidelines issued by the NITI Aayog and procure the equipments in order to promote ' Make In India ' and enable competitiveness of the industry by way of reduced capital costs .

The Mission will have a sunset clause after completion of its target year i.e 2023-24.

C: Intellectual Property

The Intellectual Property (IP) of the research outcome will generally vest with the Government. In cases, where a participating Industry Partner has contributed substantially, the concerned Industry Partner will have right over the IPs for a certain period. The policy regarding Intellectual Property rights out of the research outcomes will be as follows:

(i) Situation-1: A technology purely developed by an academic institution/ public funded laboratory.

The IP will be licensed as per the institutional IP policy of the concerned academic institution/public funded institution or in the absence of such institutional IP Policy, will be governed by the National Government IP policy. To the extent possible, IP may be open for licensing to any interested party or non-exclusive basis.

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(ii) Situation 2: An IP generated by an academic institution/ public funded laboratory is further scaled up through pilot/ validation project jointly with an industry partner resulting in new joint IPs.

The partnering Industry may enjoy 'the right of first refusal' on the IP component of the joint IPs, residing with academic institution/ public funded laboratory and can be exclusively licensed to the Industry partner for a period of one year from the date of completion of the pilot scale/validation project. Beyond that period, the IP in question will be available to open to any industrial partner for licensing on a non-exclusive basis.

(ii) Situation 3: An IP purely owned by an industry, based on which academic an academic institution/public funded institution is involved a joint project with the said industry for scale up.

In this situation, any new IP generated by the academic institution may be licensed for a period of two years to the industry partner on an exclusive basis, from the date of completion of the pilot scale/validation project. Beyond two years, after duly assessing the milestone achievements and royalty realization, the IP can either be considered for further renewal with the same industry on mutually agreeable terms or made open to any interested party as per the terms of the relevant IP policy.

D: Format of Application

1. (i) Name of the Research Body with location and other details

   (ii) Administrative Ministry/ Department of GoI:

   (iii) Head of Research Project with :-

   (a) Name:

   (b) Designation:

   (c) E-mail ID:

   (d) Contact Number (Mobile No. Preferred):-

(*The Head of the Research Project should not be below Scientist 'F' under

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GoI or HoD of Academic Institute)

2. Details of Industry Partner(s) and Laboratory Partner(s)

A. Industry Partner/Laboratory Partner

(i) Name of the Industry Partner/Laboratory Partner

(ii) Address, Location,

(iii) Registration details

(iv) Current Manufacturing activities and/or Research infrastructure

(v) Name/ Designation of the Lead Person

(Add more Industry/Laboratory Partners as B, C, D, etc)

3. Name of the Research Project

4. Objective of the Research Proposal and Abstract (note more than 500 words)

5. (A)Project Methodology

(B) Project Implementation Plan with milestones and Stages

(C) Role of each Partner

(D) Desired Outcome

6. Details of Costing: Includes additional research equipment, additional contract manpower/ consultants, procurement of research materials.

7. Details of available Research and Test Equipment required in connection with the Project (in respect of Research Body, each Partner)

8. PERT / Progress Chart (colour coded to indicate role of individual partners in case of partnership with Industry and other Laboratory) with Stages and Outcomes.

9. How the final outcome will benefit the society / economy as a whole (in quantifiable terms as much as possible).

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