

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, hygiene 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.
5. Research on making textiles more sustainable like water consumption reduction, increasing use of renewable energy.