

**CENTER FOR NANOTECHNOLOGY & MATERIAL RESEARCH
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI**

VISION

The vision of the Center for Nano-Technology and Material Research is to assimilate the revolution in the field of Nano Science and develop and utilize the technology for the bright future of man power.

MISSION

- ?? To promote **awareness** in the region towards potential impact of nanotechnology techniques and processes.
- ?? To develop **infrastructure** for the synthesis and characterization of nanoscales materials.
- ?? To encourage **technological innovation** in the wealth creating sector through nanotechnology based entrepreneurial activity, technology transfer and skills acquisition.
- ?? To provide a **forum** for the development of research strategy in nanotechnology area.

GOALS

- ?? To carryout world class research and development programmes aimed at realizing the full potential of nanotechnology.
- ?? To develop educational resources , skilled workforce and the supporting infrastructure and tools for the advancement of the nanotechnology.
- ?? To facilitate transfer of nanotechnology for design of new products and processes towards economic growth and public benefit.
- ?? To educate and train research workers and students in the multi disciplinary perspective necessary for ensuring rapid progress in nanotechnology.

PREAMBLE

At State level it is important to establish a road map to develop a suitable strategy for the application of nanotechnology in the industrial environment.

Development of new high performance “**Nano-enabled**” services and products components, devices, systems and processes require long term research efforts. The availability of up to date information and development of realistic scenarios are key elements for elaborating possible forms and scopes for the intervention of public funds. The strategic plan proposed in the following pages includes a description of the goals , investment strategy and the programme component areas.

PROGRAM COMPONENT AREAS

The areas of current academic and industrial activities involving the use of nano structure approach will be considered as program components which consist of the following

1. Miniaturization in micro electronic industry as evidenced through reduction on chips of the area and volume needed per transistor leading to rapid increase in computer power.
2. Micro porous materials for energy storage and separation technologies including nano structured materials for highly selective adsorption /separation processes such as H₂O, H₂ S, or CO₂ removal; high capacity, low volume gas storage of H₂ and CH₄ for fuel cell applications and high selectivity, high permeance gas separations such as O₂ enrichment, and H₂ separation and recovery.
3. Nano fluids with very effective coolant properties during various metal cutting processes for high heat removal rate.
4. Anti-corrosion /wear coatings for controlling marine corrosion and wear, anti-bacterial coatings for arresting microbial corrosion, non- chromate corrosion inhibitors etc.
5. Magnetic materials; multi-component oxides, bulk metals and alloys and coatings for recording heads and tapes, etc.
6. Efficient solar energy conversion devices, photo catalysts and fluorescent materials.
7. Thermal barrier materials for use in high temperature engines.
8. Carbon and other nano tubes, solid-state battery or multilayer ceramic capacitor elements for miniaturization.

9. Biochemical and pharmaceutical separations and their determination at nanomaterial electrode.
10. Photonic devices and smart materials for industrial applications including materials for nano tribology applications.
11. Fine functional ceramics made from nano-sized powders like BaTiO₃, PZT, ZnO, C-ZrO₂, Al₂O₃ etc.
12. Nano-sensors for monitoring of environmental pollution.

CORE GROUP FOR ESTABLISHMENT OF CENTRE :

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ACTION PLAN

The Nanotechnology Initiative envisages action plan for the following activities :

(I) **Exploration of fundamental phenomena and processes at nanoscale :**

In this area the following specific R&D activities will be pursued:

~~1.1~~ Discovery and development of fundamental knowledge pertaining to new phenomena in the physical, biological and engineering sciences that occur at the nanoscale.

~~1.2~~ Elucidation of scientific and engineering principles related to nanoscale structures , processes and mechanisms involving the study of :

- (i) Properties of quantum dots
- (ii) Thin films
- (iii) Photo and electroluminescent properties of nanoparticles
- (iv) Magnetic properties of nanostructured magnetic materials
- (v) Effect of nanoparticles on characteristics of fuel cells
- (vi) Study of nanosized super-ionic solids