

Concept Proposal
Micro And Nano Fabrication for Clinical Research

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A challenge in micro and nano fabrication is to overcome the limitations of various fabrication methods, including defects, line-edge roughness and the minimum size for the feature linewidth. There is rapidly growing interest in the utilisation of nanotechnology to deliver enhanced healthcare. It is widely believed that research in this area will lead to a new generation of medical products, with specific emphasis on those that can invoke tissue regeneration *in vivo*, thereby offering significant improvement in the associated clinical outcomes. The provision of biomaterials with nanoscale properties (surface and/or bulk) that can be exploited to induce targeted biological processes is a key element in this regard

Possible Scientific Research Activities

1. **Microsystems applied to sensors, microfluidics and space applications.**
 - a. Development of microfluidics systems for biomedical application and infrared microscopy studies.
2. **Photonic crystals for basic studies and telecommunications applications**
 - a. They are producing new samples on 2D Photonic Crystal based both on Silicon.
3. **Carbon Nanotubes**
 - a. The main research topics are, *in situ* growth and trapping of single and functionalised nanotubes.
4. **Magnetism at nanoscale.**

This is a nanofabrication activity that includes characterization studies. Targeted anticancer therapy that uses localized lethal heat to treat late-stage cancers such as breast, lung, ovarian and prostate cancers.
5. **Nanoimprinting Lithography**
 - a. This activity is mainly dedicated to selfassembling and molecular electronics studies.
6. **Fundamental research** in nanotechnology as applied to biomaterials, medical components/devices and related areas. The delivery of drugs and functionality can be enhanced by nano-particles.
7. **Nanofabrication of biomaterials** and provision of nanostructured medical components and devices. Tiny nanoparticles could be launched into tumours and heated up using light to destroy cancer cells.
8. **Applied research** for the provision of relevant nanofabrication processes
9. **Applications of bio-nanotechnology**

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10. Biological applications microelectromechanical systems (BIOMEMS)

11. Molecular bioengineering

12. Biomedical materials,

13. Nanotechnologies for tissue engineering and regenerative medicine
stimulated repair; help the body to (re)build organs or systems

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