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Ethically sourced materials with nanobio-technology towards affordable health

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BioMaterials and Tissue Engineering (BMTE) was formed in the year 2007 at School of Medical Science and Technology with the main emphasis on product development research based on fundamental understanding of cell-material interactions and *in vivo* response with preclinical model. BMTE is working on the development of customized implants through various top-down and bottom-up fabrication techniques. Primarily, the group is developing permanent implants for rehabilitation and biodegradable implants for tissue regeneration.

In this context, metal and ceramic-based permanent implants like mandible, dental crown, cortical bone etc. are manufactured by near net shape fabrication (direct casting and green state machining) approach. Bio-activation/ surface modification of implants for biological fixation is another important area of research. Different kinetically driven processes like microwave irradiation and electro-spinning are utilized for quantum dots and nano/micro-fibrous mat fabrication for live-cell and tissue imaging, tissue regeneration, wound healing applications.

Under the regenerative medicine approach, this group is developing biodegradable/bioactive materials with nano-micro architecture for skin, bone and cartilage tissue engineering. Different factors like scaffold architecture, chemistry, dynamic and static conditions are studied to improve cell-material interactions toward stem cell differentiation into native tissue phenotypes. Also, the group is exploring diverse natural resources for isolation of bioactive molecules, biopolymers and materials for better healthcare delivery. The group has activities from materials development, the study of cell biology and biochemical assays *in vitro* and *in vivo* towards final product development. Some of the products are already used for clinical case studies and some of them and in the intermediate stage of technology transfer.