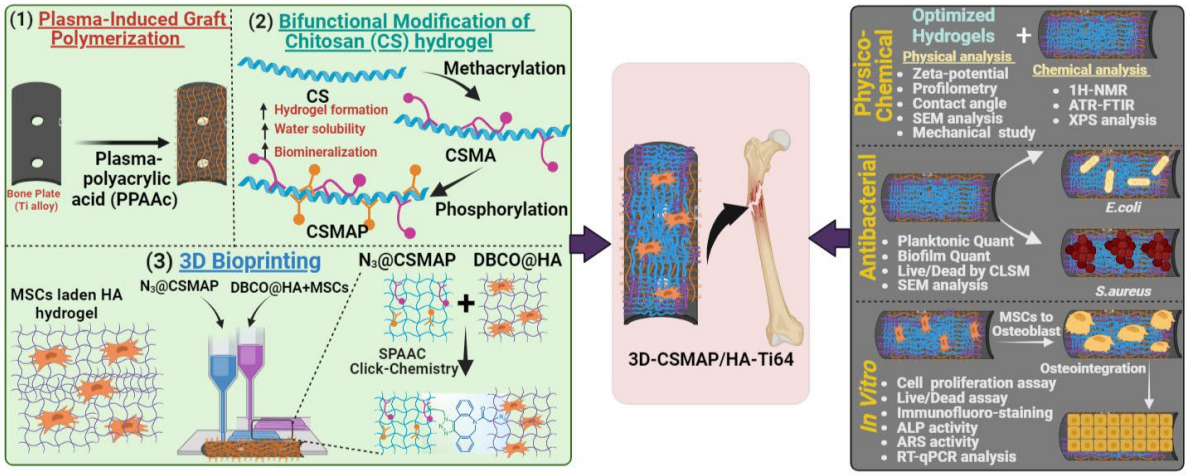
Click Chemistry Induced Cell-Laden 3D Hydrogel Integrated Orthopaedic Implants to Combat Infections and

Principal Investigator
Dr. U. Anjaneyulu
Assistant Professor
Centre for Biomaterials, Cellular and Molecular Theranostics (CBCMT)

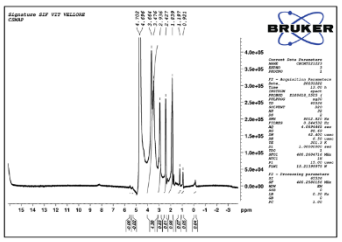
Graphical Abstract/ Layout

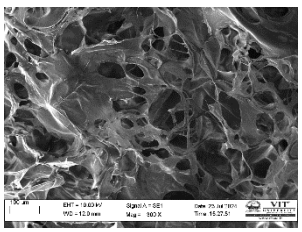


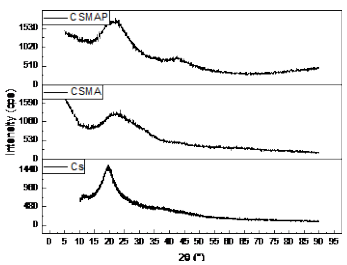
Project Description

This project aims to develop cell-laden 3D-hydrogel coatings on orthopedic implants. This project's sub-hypothesis are as follows: (i) Ti alloy surfaces will be activated with plasma-induced acrylic acid polymerization to engage the strong adhesion of hydrogel coatings; (ii) 3D bioprinting of bilayer cell-laden hyaluronic acid and bifunctional chitosan hydrogels will be combined with SPAAC click chemistry to stipulate robust intra-layer binding stability. (iii) HA hydrogel will be loaded with mesenchymal stem cells to promote rapid biointegration, and (iv) the CSMAP hydrogel will impart intrinsic bactericidal activity to reduce infections while also promoting bone mineralization and integration. This 3D bioprinting-assisted click chemistry-induced layered hydrogel coatings on implants will alleviate bacterial infections while providing a bio-microenvironment for bone tissue integration. The project's successful outcomes will shed light on bone-to-implant interactions, aiding in the development of better bone health solutions and new sustainable orthopaedic implants for long-term clinical success.

Products/ Instruments/ Results/ Outreach Activities







samahospital.com
atslab.com

***

Name of the Funding Agency
Science and Engineering Research Board (SERB)

Name of the Scheme
Startup Research Grant (SRG)

Sanctioned Amount (in Rupees)
Rs. 32,70,000

Duration of the Project (years)
2