Functionalised Graphene Quantum Dots Iron Oxide Formulation for the Therapeutic Assessment of 3D Triple-Negative Breast Cancer model in Hyperthermia Condition

Principal Investigator
Dr. Niroj Kumar Sahu
Professor
Centre for Nanotechnology Research (CNR)

Co-Principal Investigator
Dr. Arunkumar Palaniappan
Assistant Professor
Centre for Biomaterials, Cellular and Molecular Theranostics (CBCMT)

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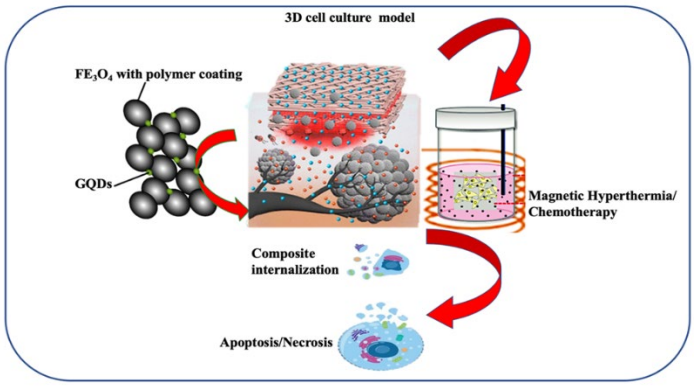
Name of the Funding Agency
Indian Council of Medical Research (ICMR)

Name of the Scheme
Extramural Research Programme of Science and Technology

Sanctioned Amount (in Rupees)
Rs. 33,14,085

Duration of the Project (years)
3

Graphical Abstract/ Layout



Graphical representation the 3D tumor model

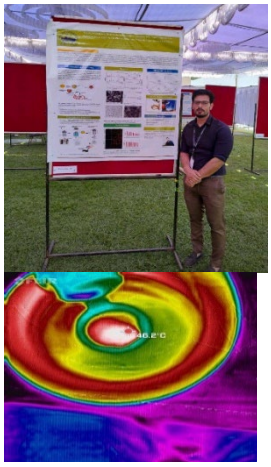
Project Description:

Cancer, especially aggressive forms like triple-negative breast cancer (TNBC), poses significant treatment challenges due to uncontrolled cell growth and lack of estrogen, progesterone, and HER-2 receptors. Traditional 2D cell culture models fail to mimic the complex 3D environment of tumors, limiting their effectiveness in research.

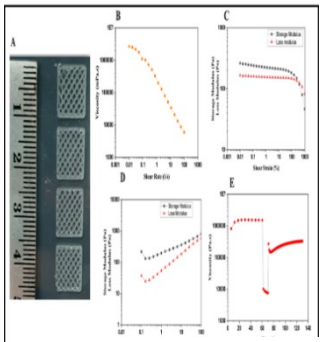
This project aims to develop a 3D bioprinted TNBC model using gelatin-based hydrogel and treat it with graphene quantum dots iron oxide (GQDs@Fe3O4) nanocomposites, synthesized via electrochemical and solvothermal methods. These nanocomposites will be tested under magnetic hyperthermia, in combination with chemotherapeutic drugs like doxorubicin and paclitaxel.

By creating this 3D model and exploring the use of nanocomposites in hyperthermic conditions, the project aims to provide new insights into cancer treatment and improve the accuracy of *in vitro* cancer models, reducing the need for animal testing.

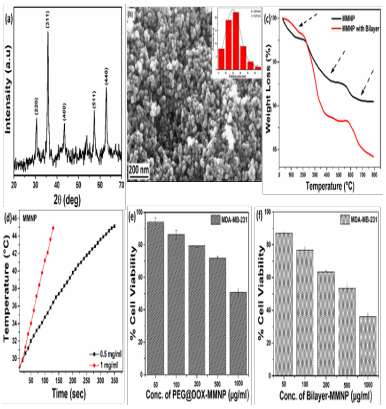
Products/ Instruments/ Results/ Outreach Activities (Pictures)



Thermal images of the hydrogel



Gelma bioprinted model



Characterization of the iron oxide(Fe_3O_4) naoparticles