

ARJAMA MUKHERJEE**Research Scholar** (2018-2022) (Submitted PhD Thesis)

National Center for Nanoscience and Nanotechnology

University of Madras, Chennai 600025

Specialization: Biomaterial based nanogel for cancer

and orthopedic applications, Biomedical

Nanotechnology

Email: mukherjee.arjama@gmail.com**RESEARCH INTEREST**

Multifunctional Nanomaterials, Biobased Nanogel, Biomaterials for medical applications, Surface Engineering, Biomaterial based scaffolds for tissue engineering application

EDUCATION

Degree	University/Board	Year	Marks/Grade/CGPA	Remark
Ph.D. (Thesis Submitted)	National Center for Nanoscience and Nanotechnology, University of Madras, Chennai	2018-2022 expected	–	2022 expected
Biotechnology Dual Degree (B.Tech+M.Tech)	KSBT, KIIT University, Bhubaneswar	2012-2017	9.01	Among top 10 in college
Higher Secondary	West Bengal Council of Higher Secondary Education	2010-2012	424 out of 500(84.8%)	Among top 50 in the Board

<i>All India GATE (2017) Rank: 881</i>	<i>GATE (2017) Score: 409</i>	<i>Marks out of 100: 43.36</i>	<i>Percentile: 88.59</i>
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Ph.D. THESIS**Title: Fabrication of Biomaterial Based Nanogel for Breast Cancer and Orthopedic Applications**

Summary: We have focused on the fabrication of natural polymeric nanocarriers and its application in the medical field (mainly cancer biology and tissue engineering). My work involves the fabrication of biomaterial-based components at nanoscale and studying its properties and application. So, the thesis is divided into two application parts related to the therapeutic application of biomaterials for breast cancer and bone tissue engineering. These works on hydrogels based on biomaterials describe the formation of hydrophilic 3D polymer networks that can give a maximum drug loading and sustained drug release capacity while maintaining their internal network structure. Doxorubicin (DOX) loaded HA-DOP-CS hydrogel cubes capable of both intracellular degradation and pH-responsiveness. The photothermal effect and photo dynamic effect was present due to ICG loading which makes our material more toxic to cancer cells. We focused on the development of injectable boneactive hydrogel to mimic the ECM. Electrophoretic deposition process of the Collagen-PDAGG- hBN composite coating on titanium sheet has also been investigated for developing bioactive coatings for bone tissue engineering purposes. Further the antimicrobial assay and several *in vitro* assays has confirmed the hydrogels to be non-toxic, biocompatible, and biodegradable. These properties of biomaterial-based hydrogel were utilized in my work for bone tissue engineering and breast cancer applications.

DISSERTATION THESIS**Title: Olaparib Enhances the Anti-Colon Cancer Action of Curcumin by Inhibiting DNA Repair Capacity*****In Vitro***

Summary: Cancer cells have extensive DNA repair capacity by which they repair the damaged DNA and proliferate further. For repair of the damaged DNA, they recruit PARP-1, which binds to the damaged strand and initiate the

process of repair. Activated PARP-1 forms PAR (Poly ADP ribose) chain and then recruit other DNA repair complex and repair the DNA. Activated PARP-1 expression has been reported by many researchers in hematologic and solid tumors. Here, we have presented the cytotoxic effect of Curcumin with Olaparib, a PARP inhibitor, on Colon Cancer Cell HCT-116 to get better therapeutic effect. Decreased PAR formation and increased γ H2AX expression was seen after Olaparib treatment in Curcumin pre-treated cells. Increased comet formation in cells treated with combination of drugs indicates increased DNA damage compared to the cells treated with drugs alone. Increased apoptosis also proved effective therapeutic activity of Curcumin+Olaparib in HCT-116 cells. Decreased Luciferase activity was also observed in combination treatment stating effectiveness of therapy in in vivo. These results state that Curcumin causes DNA damage and the repair at that damage site is inhibited by Olaparib through inhibiting PARP-1, resulting in an irreparable DNA damage and subsequent apoptosis. Thus, combination of Curcumin and Olaparib decreased HCT-116 cell growth by inhibiting PARylation within the cells.

PUBLICATIONS

1. **M.Ariama**, S.Mehnath, M.Rajan, M.Jeyaraj, Engineered hyaluronic acid-based smart nanoconjugates for enhanced intracellular drug delivery, Journal of Pharmaceutical Sciences,(2021) <https://doi.org/10.1016/j.xphs.2021.10.005>. (**Impact Factor: 3.53**).
2. **M.Ariama**, S.Mehnath, M.Rajan, M.Jeyaraj, Injectable cuttlefish HAP and macromolecular fibroin protein hydrogel for natural bone mimicking matrix for enhancement of osteoinduction progression, Reactive and Functional Polymers 160 (2021) 104841. (**Impact Factor: 3.97**).
3. **M. Ariama**, S.Mehnath, M. Rajan, M. Jeyaraj. Sericin/RBA embedded gellan gum based smart nanosystem for pH responsive drug delivery. International Journal of Biological Macromolecules. (2018) 120: 156-1571. (**Impact Factor: 6.95**).
4. S.Mehnath, **M.Ariama**, M.Rajan, K.Premkumar, K.Karthikeyan, **M.Jeyaraj**, Mineralization of bioactive marine sponge and electrophoretic deposition on Ti-6Al-4V implant for osteointegration, Surf. Coat. Technol. 392 (2020) 125–127. (**Impact Factor: 4.15**).
5. S.Mehnath, **M. Ariama**, M. Rajan, M. Jeyaraj. Development of cholate conjugated hybrid polymeric micelles for FXR receptor mediated effective site-specific delivery of paclitaxel. New Journal of Chemistry. (2018) 42: 17021-17033 (**Impact Factor: 3.59**)
6. S.Mehnath **M. Ariama**, M. Rajan, M. Arokia Vijayaanand, M. Jeyaraj. Polyorganophosphazene stabilized gold nanoparticles for intracellular drug delivery in breast carcinoma cells. Process Biochemistry. (2018) 72: 152-161. (**Impact Factor: 3.76**).
7. S. Mehnath, **M. Ariama**, M. Rajan, G. Annamalai, M. Jeyaraj. Co-encapsulation of dual drug loaded in MLNPs: Implication on sustained drug release and effectively inducing apoptosis in oral carcinoma cells. Biomedicine & Pharmacotherapy. (2018) 104: 661–671. (**Impact Factor: 6.53**).
8. S.Mehnath, M. Ayisha Sithika, **M. Ariama**, M Rajan, R. Amarnath Praphakar, M. Jeyaraj. Sericin-chitosan dopedmaleate gellan gumnanocomposites for effective cell damage in Mycobacterium tuberculosis. International Journal of Biological Macromolecules. 122 (2019) 174–184. (**Impact Factor: 6.95**).

CONFERENCES AND ORAL PRESENTATION

- Speaker in Longdom Webinar on "Nanoengineering and Its Applications - 2020". (22 July 2020) [Organized by Longdom Conferences]
- Oral presentation on "Proteinpolysaccharide based green nanocomposites for pH responsive drug delivery" in International Conference on Advanced Materials Behavior and Characterization (ICAMBC) - 2020 (18-23 July, 2020) [Organized by Mattest Research Academy].
- Oral presentation on "Polyorganophosphazene stabilized gold nanoparticles for intracellular drug delivery in breast carcinoma cells" in Recent Trends in Drug Discovery, Development and Targeted Delivery System for Cancer- 2019 (RTDTC 2019, 26-27 September, 2019) [organised by J.J. College of Arts and Science]
- Oral presentation on "Sericin/RBA embedded gellan gum based smart nanosystem for pH responsive drug delivery" in International Conference on Nanomedicine (ICON) - 2019 (25-26 February, 2019)

[Organized by Madurai Kamaraj University]

- National webinar on "Nanomaterials for Biomedical Applications" conducted by KPR Institute of Engineering and Technology (15-07-2020)
- Immuno Oncology and Cancer Biology Virtual Conference (July 29, 2020) conducted by LabRoots.
- Online Awareness Pledge on Covid-19 (12-19 July, 2020) organized by KPR Institute of Engineering and Technology, NSS and Eco Club.
- International Virtual Conference of Biotechnology Research Center (IVCBRC 2020) conducted by Al-Nahrain University Baghdad, Iraq (25-26 August, 2020)

AWARDS AND ACHIEVEMENTS

- Awarded **InSc Young Researcher Award 2020**
- Awarded **GATE Biotechnology** (2017) with All India Rank 881.
- Awarded in **Young Research Forum Category** in Longdom Webinar on Nano-engineering 2020.
- Certificate for doing Summer Internship- 2016 at National Institute of Biomedical Genomics (NIBMG), West Bengal.
- Certificate for doing Summer Internship- 2016 at CSIR-Institute of Minerals and Materials Technology, Bhubaneswar.

TRAINING EXPERIENCE

Project Title: To study the effect of Extracellular Signaling on oral squamous cell carcinomas		
Institute: National Institute of Biomedical Genomics (NIBMG)	Guide: Dr. Sandeep Singh (Assistant Professor)	Duration: May– July, 2016
<i>I have studied the effect of Nicotine (by MTT Assay) and TGF beta in GBC Cell line and I have observed that TGF beta induces Epithelial to Mesenchymal Transition (EMT) by Immunocytochemistry, quantitative Real Time PCR (qRT-PCR). During my internship, I have also identified Cancer Stem Cells by Aldefluor Assay using FACS</i>		
Project Title: Isolation and Identification of Cadmium resistant bacteria from marine environment		
Institute: CSIR-Institute of Minerals and Material Technology (IMMT), Bhubaneswar	Guide: Dr. C. R. Panda (Chief Scientist- Head)	Duration: May– July, 2015
<i>I have successfully isolated three bacterial strains (SW 3C, SW 7A, BW 5A) from the surface and bottom water of Chilika Lake. Then they were characterized, checked for co-resistance against other heavy-metals and growth study was done. My study successfully concluded that these strains were cadmium resistant and can be applied in Bioremediation.</i>		

HANDS ON EXPERIENCE

Molecular Biology Extraction of Plasmid DNA, Genomic DNA and RNA, RFLP, PCR, qRT-PCR, Restriction digestion, SDS-PAGE, Molecular Cloning, Transformation, Transfection, Primer Designing, ELISA, Western Blotting etc.

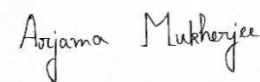
- Cell Biology** Mammalian and Bacterial Cell culture, Cell fixation and permanent slides preparation techniques and histochemical staining, Karyotyping, Ideogram, Comet Assay, Visualization cell organelles, etc.
- Immunology** Immunofluorescence, Immunohistochemistry (IHC), Methods of Immunization, Double Immunodiffusion
- Biochemistry** Gel-filtration Chromatography, Ion exchange Chromatography, Protein purification and precipitation.

REFERENCES

Dr. S. Balakumar Professor, Director NCNSNT, University of Madras Email: balakumar@unom.ac.in	Dr. M. Jeyaraj Assistant Professor NCNSNT, University of Madras. Email: jeyaraj@unom.ac.in
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DECLARATION

I hereby declared that the above-mentioned information is true to the best of my knowledge.



(ARJAMA MUKHERJEE)
