

Congratulations for seeking Govt. Sponsored Project

Name: **Dr. Santanu Ghosh (Principal Investigator)**

Department: **Pharmaceutical Sciences and Technology**

Project Title: **Development of Renewable Resource-based Hemostatic Tissue Sealant with Intrinsic Antioxidant, Antimicrobial Properties for Efficient Wound Closure.**

Funding Agency: **Anusandhan National Research Foundation – Prime Minister Early Career Research Grant (ANRF-PMECRG)**

Sanction Amount: **5500000**

Fund Utilised.: 0

Tenure: **3 Years**

Abstract:

Tissue injuries caused by trauma or surgery require rapid wound closure to control bleeding and restore tissue integrity. Although sutures are widely used, they are painful, time-consuming, and less effective for irregular or leakage-prone wounds. Existing natural polymer-based sealants often suffer from poor adhesion and excessive swelling, while petroleum-derived synthetic sealants such as cyanoacrylates and polyethylene glycol materials may cause toxicity, inflammation, and biodegradability concerns. In addition, most current sealants lack intrinsic antioxidant and antimicrobial properties, increasing the risk of infection and delayed healing. These limitations highlight the need for sustainable, biodegradable, and bioactive tissue sealants derived from renewable resources.

This work proposes the development of a photocurable polyester-based tissue sealant synthesized from ricinoleic acid, the major unsaturated fatty acid in non-edible castor oil, and zingerol, a bioactive ginger-derived compound. Ricinoleic acid is expected to impart hydrophobicity and improve retention on bleeding wounds, while zingerol is anticipated to provide antioxidant and antimicrobial activity. The synthesized ricinoleic acid–zingerol polyol will be methacrylated to obtain a UV-photocurable resin capable of polymerizing within 30–40 seconds under 370 nm light to form an in situ hemostatic sealant. Adhesion is expected to arise from non-covalent interactions between tissue functional groups and the hydroxyl-rich polymer network, minimizing fluid leakage. Ester linkages within the polymer backbone will enable biodegradability.

The photocured material will be evaluated for swelling, degradation, adhesion, hemocompatibility, antioxidant, and antimicrobial properties, followed by validation in a rat incision wound model. The developed renewable-resource-based sealant is expected to provide a sustainable, clinically relevant alternative for wound closure, with planned commercialization through MedrinzBio.