



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: **Studies on Polyvinyl Alcohol-Starch Composite Films Targeting Wound Dressing Applications**
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SHORT ABSTRACT

Considering the limitations of expensive and hazardous recycling and disposal methodologies of synthetic polymers and affordability, shelf life, cost and mechanical stability related issues of biodegradable natural polymers, biodegradable-polymer composite materials are the need of the hour towards wound dressing and food packaging applications. The thesis devoted towards the alternate characteristics based optimality of solution casting based PVA-St-organic acid-glycerol (GI) blended composite films. Firstly, the thesis advocated upon the optimality of citric acid (CA) concentration, drying time and temperature of the mentioned films with respect to promising combinations of swelling index, solubility, in-vitro degradation, antibacterial activity characteristics and tensile strength. Thereafter, response surface methodology (RSM) was adopted for fixed choice of optimized casting process parameters and variant constituents of all precursors. Thirdly, the thesis addressed upon the role of %Elongation as an additional variable in influencing the optimal outcome of the findings. Fourthly, the work devoted towards a comparative analysis of CA, malic acid (MA) and tartaric acid (TA) based PVA-St composite films. Finally, due to the improvised performance of MA based films in conjunction with the CA based films, response surface methodology was adopted for the constitutional optimization of the MA based PVA-St composite films. HEK cells based MTT assay characterization studies have also been conducted for the optimized CA and MA based PVA-St films. The optimal film constitution referred to 6.92 w/w% PVA, 6.67 w/w% St, 25.96 wt% MA and 18.38 wt% GI for which the best responses have been obtained as 583.83 % SI, 65.47 % WL, 5.57 MPa TS and 99.53 % elongation, 181.95 % relative growth rate with the HEK cells. Also, the optimal MA based film constitution has been 4.56 % inexpensive with respect to the optimal CA based film constitution and thereby inferred to be the most relevant candidate for the targeted commercial wound dressing films in terms of improvised performance and reduced cost.