

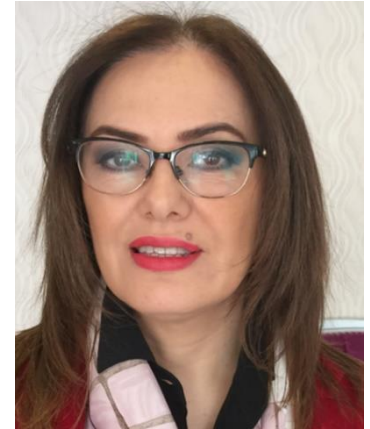
Seminars in Biotechnology BTEC 591 & BTEC 691

“Evaluation of Pectin-Based Sustained-Release, Hemostatic, Shear Thinning Tydrogels for Wound Healing Applications with in vitro, in silico, and in vivo Approaches”

Thursday, December 1, 2022

13.30

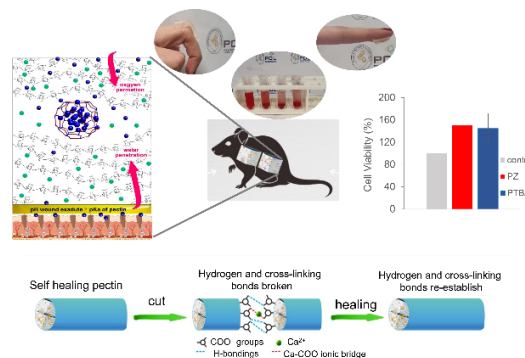
GTU Institute of Biotechnology, Lecture Hall



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A fundamental healthcare concern, wound management, particularly for chronic wounds (such as infected wounds, venous leg ulcers, and diabetic foot ulcers), has greatly increased the financial burden on the public. The aim of this study is to carry out in vitro, in silico, and in vivo studies to improve and then assess two different pectin-based hydrogels with either zeolite-A or 2-thiobarbituric-acid (TBA) in the form of a wound dressing.



We use FTIR, SEM, DSC, contact angle, rheology, swelling, and drug release analysis to identify the conformational, morphological, and structural properties of the hydrogels. We determine that; (i) both matrices produce long-term controlled drug release, (ii) they have 'self-healing' properties that extend the life of the dressings, (iii) They displayed re-moldable qualities, which can include the ability to adjust dynamically to movement and survive deformation caused by a body moving at different angles, and (iv) they show biocompatible, antibacterial and hemostatic properties. We also pointed out that TBA-added hydrogel has higher mechanical properties. Molecular dynamics simulations are used to reveal the mechanism behind this observation. It is observed that TBA inclusion in the pectin hydrogel is increased the number of secondary interactions inside the matrix. Then, these dressings are employed

in vivo wound healing studies on Sprague Dawley rats with a positive-control group of Kaltostat®. Finally, the evaluation of the wound healing is done by histological examination of the skin. As a result, zeolite-added and TBA-added formulations improved the closing of the wounds when compared to the Kaltostat® positive control group.