

You are cordially invited to attend this seminar to be held on

Monday, April 3rd, 15:00
Room 118, Wolfson Engineering Building

Composite Hydrogels For Bioadhesive And Surgical Sealant Application

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Under the supervision of Prof. Meital Zilberman

Bioadhesives are polymeric hydrogels that can adhere to a tissue after crosslinking and are an essential element in nearly all surgeries worldwide. The use of bioadhesives and sealants for wound closure and healing applications is becoming more and more popular, particularly when other techniques, such as stapling or suturing, are impractical or inefficient. The main limitation of current tissue adhesives is the tradeoff between biocompatibility and mechanical strength, especially in wet hemorrhagic environments.

Therefore, the current research focuses on the development and study of novel bioadhesives based on a combination of the biopolymers gelatin with alginate and crosslinked with carbodiimide. Furthermore, the bioadhesives are incorporated with hemostatic agents (tranexamic acid, kaolin and montmorillonite) in order to induce hemostatic effects, improve the adhesion abilities in the hemorrhagic environment of the wound and to increase the cohesion strength. Such bioadhesives are novel, have not been developed and studied before and are not available in the market. The effect of the bioadhesive's components on the mechanical strength was studied by four different methods - burst strength, lap shear strength, tensile strength and elastic modulus in compression. The physical properties were evaluated by the viscosity, gelation time, swelling ratio and weight loss. The structural features of the bioadhesive were studied by environmental scanning electron microscopy and X-ray diffraction. The cytotoxicity of the bioadhesive was evaluated in extraction mode. Our bioadhesive formulations present excellent mechanical properties and superior to those commercial bioadhesive. The incorporation of the functional fillers in the polymeric matrix resulted in special microcomposites and nanocomposites that improves the bioadhesive's function and properties. The formulation-structure-property effects of our novel bioadhesives will be presented in the seminar.