Novel mesh based on nano bacterial cellulose and poly(lactide-co-glycolide) composite

Chen Lai, PhD, Peking university Shenzhen institute, China

Abstract (300 word limit)

The current study was designed to evaluate and directly compare the biomechanics and biocompatibiltiy properties of the novel bacterial cellulose (BC) and poly(lactide-co-glycolide) (PLGA)/BC composite meshes. Composite mesh was characterized by Fourier transform infrared spectroscopy (FTIR), X-ray photoelectron spectroscopy (XPS), atomic force microscopy (AFM) and scanning electron microscopy (SEM), demonstrating that PLGA only adheres to the BC surface. Laser perforation generated isotropic, flat and stable structures that prevented deformation under pressure and reduced the risk of potential bacterial colonization. In contrast to the pure BC mesh, the results of the *in vitro* study, which involved protein adsorption and cell-material interaction, suggested that composite mesh preferentially adsorbed bovine serum albumin (BSA) and enhanced the expression of type I collagen in fibroblasts. PLGA/BC mesh caused less inflammation and was surrounded by newly formed connective tissue composed of type I collagen after implantation in a rabbit model for one week, demonstrating that the novel mesh is fully biocompatible and can integrate into surrounding tissues. From this study, PLGA/BC mesh may prove to be a viable clinical alternative to existing materials. .

Image

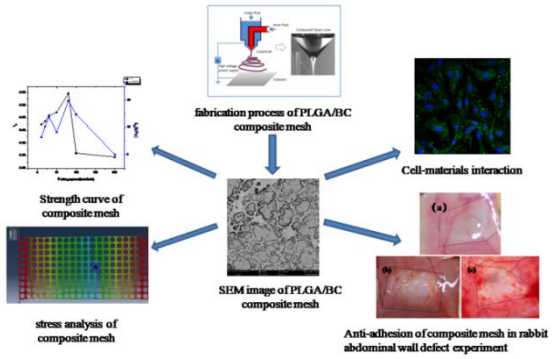


Figure 1 physical, chemical and biological effects of PLGA/BC composite mesh

Recent Publications (minimum 5)

1. Lai C, Zhang SJ, Wang LQ, Sheng LY,Zhou QZ, Xi TF (2015) The relationship between microstructure and in vivo degradation of modified bacterial cellulose sponges. Journal of Materials Chemistry3: 9001-9005
2. Lai C, Zhang SJ, Chen XC, Sheng LY(2014) Nanocomposite films based on TEMPO-mediated oxidized bacterial cellulose and chitosan. Cellulose 21:2757–2772
3. Lai C, Sheng LY, Liao SB, Xi TF, Zhang ZX (2013) Surface characterization of TEMPO-oxidized bacterial cellulose. Surface and Interface Analysis.45：1673–1679
4. Lai C, Sheng LY, Liao SB, Xi TF, Zhang ZX (2013) TEMPO-mediated Oxidation of Bacterial Cellulose in a Bromide-free System. Colloid and Polymer Science. 291：2985–2992
5. Lai C, Shu HK, Li WQ, yuan SL, zhang SJ,zhang Y (2018) Anti-adhesion mesh for hernia repair based on modified bacterial cellulose. Starch. 1700319:1-10



Biography (150 word limit)

Chen Lai received her PhD from Hunan University for studies on biomaterials. She is Vice director of biomedical engineering center in Shenzhen institute Peking University, with responsibility for research activities on bacterial nano-cellulose (BC). Major research areas are BC modification and its clinical applications. .

Email: laic@ier.org.cn

Notes/Comments: