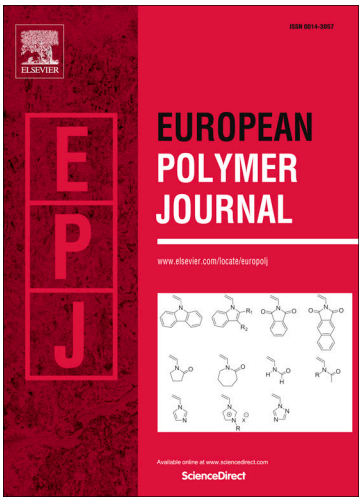


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# Mechanical properties of TEMPO-oxidised bacterial cellulose-amino acid biomaterials

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**Abstract**

Amino acid functionalised bacterial cellulose is a non-toxic biocompatible material, which can be further modified with active groups and nanoparticles for various biomedical applications. Many studies have focused mainly on the chemical and biomedical characterisation of modified bacterial cellulose; however, the mechanical performance of these materials remains undetermined. In this paper, we investigate the mechanical performance of amino acid modified TEMPO-oxidised bacterial cellulose (TOBC-AA). Highly crystalline bacterial cellulose was initially oxidised via TEMPO-mediated oxidation and amino acids – specifically glycine, alanine and proline- were grafted to TOBC via EDAC/NHS coupling agent. Manufactured materials have been tested and compared with pure bacterial cellulose and our recently studied monomeric amino acid bio-glues. Under tensile loading, the rigid crystalline structure of the copolymer has a slightly higher strength and toughness compared to pure BC, however its adhesive properties were significantly lower than those of monomeric amino acids. The side chains on TOBC-AA physically interlock under the conditions of shear; however amino acids grafted to BC lack mobility and the ability to form H-bonds, in contrast to monomeric amino acid such as glycine and alanine.