

**NEW TRENDS IN BIOTEXTILES – THE CHALLENGE OF TISSUE ENGINEERING**Ruwan D. Sumanasinghe¹ and Martin W. King^{1,2}¹ College of Textiles, North Carolina State University, Raleigh, NC 27695-8301, USA,
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d'Assise, 10 rue de l'Espinay, Québec, QC, G1L 3L5, Canada,**ABSTRACT**

So you think that the Bionic Woman and the Six Million Dollar Man were simply science fiction stories? Think again! Rapid advances in the biological sciences and nanotechnology are becoming fused together to create the field of tissue engineering which is developing biological substitutes for the repair and regeneration of tissues and organs. This paper presents an overview of the latest concepts used in the field of tissue engineering and highlights those aspects of this multidisciplinary endeavor where polymer chemistry, fiber science and textile technology and engineering can make a significant contribution in the future design and development of novel biotextile scaffolds.

Keywords: biotextiles, biological sciences, nanotechnology, tissue engineering, scaffolds, resorbable polymers, cell culture, bioreactor, in vivo, in vitro, cell signalling, gene therapy, nanofabrication

Introduction

Recent and rapid advances in both the biological sciences and in material science, especially in molecular biology, genetic engineering, genomics, bioinformatics, biomimetics, surface science and nanotechnology are propelling us into novel collaborative research ventures so as to create new knowledge and understanding at the boundaries of previously disparate disciplines. This has been particularly true in the field of biotextiles, where we study the performance and properties of implantable textile products in a biological environment.

T The objective of this paper is to show how the disciplines of molecular biology, immunology, embryology, gene therapy, biopolymers, biomimetics and nanotechnology are having an immediate impact on the study of biotextiles, implantable medical textiles and tissue engineering. Research work in this area demands an understanding of the latest technologies for polymer synthesis, fiber spinning, surface modification and nanotechnology, an appreciation of the new concepts in biological science, as well as a creative imagination to integrate these disciplines.