Preface

Over the past 50 years, the quest for materials intended to interface with biological systems in order to evaluate, treat, augment, or replace any tissue, organ or function of the body has resulted in the creation of the interdisciplinary field called *Biomaterials Science*. Then in the 1960s, with the introduction of the first synthetic resorbable suture Dexon®, the new field of resorbable biomaterials was launched. Since that time, a new generation of synthetic bioresorbable polymers has been developed specifically for biomedical applications, and there are a number of driving forces for the favorable consideration of bioresorbable over biostable materials. They include: (i) improved long-term biocompatibility compared to many of the existing permanent implantable materials, (ii) the advantage of not having to remove the bioresorbable implant once it is no longer needed, thereby avoiding a second surgical operation, and (iii) the growth of emerging biomedical technologies, such as tissue engineering, regenerative medicine, gene therapy, controlled drug delivery, and bionanotechnology, all of which require bioresorbable materials. It can be predicted that in the near future, bioresorbable devices that will assist in the repair and regeneration of damaged, diseased, and injured tissues will replace many of the permanent prosthetic devices. Thus, the topic of *Bioresorbable Biomaterials* generates considerable interest and research activity in the field of biomaterials science today.

Because of the structural requirements of medical devices for their intended end-use and the technological advancements in synthetic fibers and textile technology, a new field of *Biotextiles* has evolved to utilize the potential of various woven, knitted, braided, and nonwoven textile structures for biomedical applications. Biotextiles are defined as those structures composed of textile fibers designed for use in specific biological environments where their performance depends on their biocompatibility and biostability with cells and biological fluids. Textile structures consisting of bioresorbable fibers provide certain unique properties to the medical device. One example for instance, involves the filaments of a braided suture, which initially provides the strength and flexibility to hold the wound together. A second example addresses the dimensional stability of a textile tissue engineering scaffold, which maintains its required shape and size while withstanding the initial shear forces imposed by the circulating culture media in a bioreactor, the contractile forces imposed by growing cells, and the compressive forces from the surrounding tissue. In addition, because textile structures have an inherently high level of porosity, they can encourage cell growth and promote migration and proliferation. Thus, most of the applications of bioresorbable polymer devices such as sutures and scaffolds require the biomaterial to be fabricated into a dimensionally stable structure so as to function effectively. For these reasons, the use of bioresorbable polymers as fibers is currently dominating the field of resorbable biomaterials for biomedical applications.

This review focuses on those synthetic bioresorbable polymers that can be spun into fibers or filaments, and subsequently used as biotextiles. We have listed and reported on the properties and applications of both conventional and commercially available fiber-forming bioresorbable polymers as well as those that are still being developed experimentally. Factors affecting the performance of these biomaterials are presented and the precautionary measures that may be taken to reduce the hydrolytic degradation during manufacturing and processing are discussed.

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