Chapter 5

3D Scaffolds of Borate Glass and Their Drug Delivery Applications

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5.1 INTRODUCTION

One of the biggest concerns that have attained the attention of human society is health. Longer life expectancy due to better living standards often results in surgeries in the later part of life as humans have begun to outlive the lifetime of human tissue. A biomaterial is any substance that has been wangled to interact with biological systems for a medical purpose. Recently, the idea of inserting external objects into the human body has emerged numerously. The earliest known examples of using biomaterials for medical purposes include sewing of wounds and replacement of teeth with materials of biological origin. New methods are being established and introduced in medical science to carefully select and craft materials to recover or replace physiological disabilities. For the past 50 years, innovative devices such as joint replacements, pacemakers, lenses, cochlear implants, artificial heart valves, and blood vessels have expressively extended life quality in society (Schmalz and Arenholdt-Bindslev, 2008). These devices are termed "implantable medical devices," and the materials suitable for producing them are termed "biomaterials." Although highly successful in several clinical applications, the design of such implantable devices is yet far from its optimum. Development in material designs made possible by nanoscience holds promise of hitherto unprecedented material properties (Vert et al., 2012). Consequently, the anticipation and inspiration for further research in biomaterials and implantable medical devices intensified. The unifying property of biomaterials is biocompatibility. The commonly referred to definition of biocompatibility was conceded by the European Society for Biomaterials in 1986 as "The ability of a material to perform with an appropriate host response in a specific application" (Williams, 2004). The traditional titanium joint replacement is considered biocompatible in that it is nontoxic, evokes a low adverse tissue response, and replaces the joint functionality. However, the biocompatibility

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