Polyhydroxyalkanoates (PHAs) as scaffolds for tissue engineering

Polyhydroxyalkanoates, Biosynthesis, Chemical Structures and Applications

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Abstract

Tissue engineering is a field that has gained a lot of advancement since the discovery of biopolymers. Biopolymers are polymers produced by living organisms; that is, they are polymeric biomolecules. They consist of monomeric units that are covalently bonded to one another in order to form larger structures. Biopolymers have been widely used as biomaterials for the construction of tissue engineering scaffold. Scaffolds have been used for tissue engineering, such as: bone, cartilage, ligament, skin, vascular tissues, neural tissues, and skeletal muscles. Polyhydroxyester is a typical example of biopolymers that have been employed for this application. Their exceptional properties such as high surface-to-volume ratio, high porosity with very small pore size, biodegradation, and mechanical property have made them gain a lot of attention in this field. Also, they have advantages which are significant for tissue engineering. This chapter will focus on the production, modification,

properties and medical applications of polyhydroxyesters, such as PLA (Polylactide), PGA (Polyglycolide or poly(glycolic acid)), PCL (Polycaprolactone), poly(ester amide)s and PLGA (Poly(lactide-co-glycolide), with particular emphasis on the different polyhydroxyalkanoates (PHAs), which have diverse applications in tissue engineering.