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Authors: T. Hemamalini, V.R. Giri Dev

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# Comprehensive review on electrospinning of starch polymer for biomedical applications

T. Hemamalini and V.R. Giri Dev

Department of Textile Technology, Anna University, Chennai – 600025.

## Abstract

Starch is an emerging polymer in biomedical research area due to its ease of availability, low-cost and biological values. Starch polymer has been used as powder and film in applications such as tissue engineering and hemostatic application. Starch in fibrous form is very difficult to produce due to the branched amylopectin structure. With the advent of electrospinning fibrous form of starch is attempted by various researchers. The present paper reports comprehensive review of attempts made on electrospinning of starch and its potential applications in biomedical and tissue engineering.

**Keywords:** Biomedical, Biopolymers, Electrospinning, Starch.

## 1. Introduction

Nowadays, polymers are widely used in various applications such as automotive, aerospace, medical, construction, consumer goods and packing due to its low density, high strength to weight ratio, relatively low cost, biodegradability, ease of manufacturing etc. Generally, polymers are classified into two broad categories such as natural and synthetic polymers. Among these two types, natural polymers and their derivatives are widely used in biomedical applications due to its biodegradability, biocompatibility, nontoxicity, non-inflammatory and ease of availability [1]. As natural polymers are generally biodegradable, they can be broken down into biologically acceptable molecules either by enzyme, hydrolytic or combination of degradation technique that can be metabolized and removed from the body via normal metabolic pathways [2]. It is classified into three types based on their origin as plants, animals and microbes as shown in Fig.1. Plant based polymers includes polysaccharides such as cellulose, starch, alginate, pectin, carrageen gums whereas animal based polymers are further classified into two types such as proteins (gelatin, albumin) and polysaccharides (chitin, chitosan)[3]. Polyester (polyhydroxyalkanoates) and hyaluronate polysaccharide are the

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