



Biopolymers from waste biomass and its applications in the cosmetic industry: A review

Shreya Gupta ^a, Swati Sharma ^{a,*}, Ashok Kumar Nadda ^b, Mohamed Saad Bala Husain ^c, Arun Gupta ^c

^a University Institute of Biotechnology, Chandigarh University, Mohali (140413), Punjab, India

^b Department of Biotechnology and Bioinformatics, Jaypee University of Information Technology, Waknaghat, Solan 173 234, India

^c Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang, 26300 Gambang, Pahang, Malaysia

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ABSTRACT

The utilization of cosmetics is not a recent practice. In ancient times, kohl was used by women to darken their eyelids, also, milk is used during bathing to get soften and whiten skin. Cosmetics have a huge market all over the world, and a business of billion dollars per annum. An extensive variety of ingredients involves polymers, minerals, chemicals, and also other materials like preservatives, color, pH stabilizers, emulsifiers, and thickeners to convey anticipated characteristics to the cosmetics products. Over the past years, biopolymeric materials have gained a lot of attraction in the global cosmetics industry because of their price, durability, and adaptability. Consumer awareness concerning the harmful influence of synthetic polymers on the atmosphere guides the path for biopolymer development from natural sources. Cosmetic polymers are utilized for the nanoparticle's preparation for the fragrance's delivery. Also, nanoparticles have been loaded with dermal permeation enhancers to enhance their bioactivities on the skin. Natural polymers in cosmetic formulations are of specific significance due to their eco-friendly, safe, and biocompatible characteristics. These formulations are appropriate for a number of applications such as hair, skincare, and make-up as they are highly attractive and marketable to consumers. In this review, the applications of biopolymers such as starch, chitosan, cellulose, collagen, keratin, Polyhydroxyalkanoates (PHA), etc., in cosmetic and cosmetic packaging are discussed.

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1. Introduction

In the 21st century, industries such as personal care products, confectionery, and cosmetics have been rising rapidly. It is estimated that the global market of cosmetics will reach \$429.8 billion by 2022 [1]. Cosmetics has been defined as any preparation or constituent proposed to be placed in contact with the different outer human body parts hairs, epidermis, nails, teeth, and outer genital organs [1]. Certainly, biopolymers are present in skincare products like corporate oils, moisturizing lotions, liquid soaps, and sunscreen; in hair products like fixing gels, hair dye, conditioner, moisturizing masks, tip repair, and shampoo; in make-up, nail care, and fragrance [2,3]. Each of these products has different applicability and functions, distinct properties, conformation, the process of

manufacturing, and chemical and physical parameters which require a large diversity of polymers.

In general, cosmetics need a combination of pH, color stabilizers, preservatives, water, fragrance, thickener, and emulsifier. In order to impart cosmetic products from some pharmaceutical effects, some active formulations known as cosmeceuticals are included in these products. Cosmeceutical is the merging of the cosmetics and the pharmaceutical industry. Cosmeceuticals comprise active ingredients at high concentrations and with their treatment- and prevention-intrinsic properties they hold the forefront of cosmetology [4]. In comparison to normal cosmetics, cosmeceuticals are fabricated with a greater scientific profile, and compared to pharmacological products these cosmeceutical products hold a lower therapeutic value. Cosmeceuticals are also applied topically like cosmetics but they comprise constituents that influence the skin's biological function. They enhance appearance by delivering the essential nutrients for healthy skin [4].

* Corresponding author.

E-mail address: swati.e8750@cumail.in (S. Sharma).