From HA(Hyaluronic acid) to PHA (Polyhydroxy alkanoate)

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Abstract

Hyaluronic acid (HA) is a natural and linear polymer composed of repeating disaccharide units of b-1, 3-N-acetylglucosamine and b-1, 4-glucuronic acid with a molecular weight up to 6 million Daltons. With excellent viscoelasticity, high moisture retention capacity, and high biocompatibility, HA finds a wide-range of applications in medicine, cosmetics, and nutraceuticals.

Traditionally HA was extracted from rooster combs, and now it is mainly produced via streptococcal fermentation. The talk will summarizes the research history and current commercial market of HA, and then deeply analyzes the current state of microbial production of HA by Streptococcus zooepidemicus and recombinant systems, and finally discusses the challenges facing microbial HA production and Praj technology developed to overcome the challenges.

The transition toward “green” alternatives to petroleum-based plastics is driven by the need for “drop-in” replacement materials able to combine characteristics of existing plastics with biodegradability and renewability features. Promising alternatives are the polyhydroxyalkanoates (PHAs), microbial biodegradable polyesters produced by a wide range of microorganisms as carbon, energy, and redox storage material, displaying properties very close to fossil-fuel-derived polyolefins. The talk will focus on Praj’s unique microbial platform which is able to produce different types of PHAs (PHB, PHBH, PHBV..) and is also feedstock agnostic. the most promising strategies finalized to obtain PHB-based materials with suitable and performing properties will be outlined. In particular, green and cost-effective approaches aimed to modulate and optimize the polymer technological performances will be discussed.