

Cellulose-based Smart Materials : Modifications, Industrial Applications and Sustainability

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Abstract

Limited resources and a growing world population require new ways of thinking. Worldwide, the bioeconomy is gaining traction. But despite considerable successes, a lot of research and development still needs to be done. Increasing recycled content in plastics is an important way to reduce dependence on virgin fossil carbon resources. However, alternative feedstocks, such as bio-based and renewable, should also be encouraged in order to decrease the dependency of the plastics industry on finite fossil carbon resources, and the future demand should be met by the most sustainable options available. It was remarkable to note that the utilization of cellulose was versatile in many areas of research. It exhibited in many outstanding properties including high stiffness, high thermal and dimensional stability, high chemical resistance as well as high aspect ratio. The use of cellulose was therefore gained many interests on many areas of research. It was important to note that with the growth of human population, the development on functional materials from bio-based resource was one of the key factors in order to fulfill the need of life. Cellulose was one of the most abundant occurring bio-based materials. It can be therefore gained many interests in order to develop for serving and facilitating of human life. With the long term of experience and many collaborative on cellulose research, it was further developed on its conductivity. The application of conductive cellulose was therefore versatile in many areas of research such as active packaging, electronic substrate with additional feature of flexibility, functional membrane as well as chemical sensor. A number of cellulose based material for active packaging has been exponentially increasing. Numerous approaches of cellulose packaging gained many interests due to excellent properties of cellulose such as mechanical properties, thermal stability, chemical resistance and optical properties. The emergence of cellulose based packaging was also encouraged to be developed for environmentally friendly purpose.

Keywords: Cellulose; Smart Materials; Bio-based; Modifications; Industrial Applications