

Bio-based Polymer Production through Industrial Biotechnology

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Polymer can be defined as a material polymerized between at least two monomers. Traditionally polymer has been classified as natural polymer and synthetic polymer. Recently it is further classified as biopolymer and bio-based polymer. While biopolymer focuses biodegradation irrespective its resource, bio-based polymer places weight on renewable resources. It includes biodegradable polymer from renewable resource as well as nonbiodegradable polymer from renewable resource.

Only 70 years have passed since modernized industrial society used polymer. On the while human being has used glass, iron, paper and cement for 5,500, 3,500, 1,900 and 180 years respectively. Compared relatively short history of polymer, its consumption has already overpassed glass and aluminum and takes up about 10 % of all the material used these days. Consumption and application of polymer is prospected to grow rapidly over next 30 years and replace the considerable usage of glass and iron. However its mass production and consumption are causing many pollution problems and contradictory to the sustainable development which most advanced societies are pursuing these days. To resolve many environmental problems related polymer, EU and US has started up following action plan : 1st Improvement of polymer production to reduce the consumption of energy and material, 2nd Increase the consumption of biodegradable polymer, 3rd Replace petrochemical originated polymer with bio-based polymer. Among these action plans the development of bio-based polymer is being primarily focused.

Future of bio-based polymer is promising even though its current market share is under 0.1 % compared all the produced polymer. Tokyo protocol and increased public concern on environmental issues will be beneficial for the future of bio-based polymer. Recent rapid development of biotechnology will result in the economic production of bio-based polymer near future. We have to prepare the future and give an endeavor to increase world competitiveness in this field before advanced countries such as EU, US and Japan take up major market.

References

1. Techno-economic Feasibility of Large scale Production of Bio-based polymers in EU, Final Report for the European Commission's Institute for Prospective Technological Studies, Utrecht/Karlsruhe, 2004.