



Bioplastics contributing to carbon neutral and solving marine plastic waste issue

Division of Applied Chemistry, Graduate School of Engineering

Professor Hiroshi Uyama

<https://researchmap.jp/read0168389>

Assistant Professor Yu-I Hsu

<https://researchmap.jp/yuihsu>



Abstract

Recently, marine pollution caused by microplastics has become more serious, and there is a social demand for plastic resource recycling to build a carbon-free society. Bioplastics consisting of biomass plastics that contribute to carbon neutrality and biodegradable plastics that reduce the environmental load at the time of disposal are expected to be environmentally friendly plastics. We are actively promoting industry-academia collaborative research toward the practical applications of bioplastics. A functional coating material that brings out the feature of cheap vegetable oils has been developed, which has been put into practical use as a roof paint. Furthermore, a significant improvement in the heat resistance and impact resistance of bioplastics has been achieved by a vegetable oil-based additive. We have launched a development platform for marine biodegradable biomass plastic (MBBP) using proprietary thermoplastic starch and biodegradable plastics, and are prototyping biodegradable plastic products. A molding technology for starch alone has also been developed, leading to fabrication of a multi-layer starch/polyethylene sheet.

Significance of the research and Future perspective

We strongly promote activities at the MBBP development platform in which more than 30 companies participate and the newly launched venture company (KYU Co., Ltd.) for the early social implementation of bioplastics, which are indispensable for the recycling of plastic resources. By bridging the development of materials and molding technology, we contribute to the social implementation of bioplastic products.



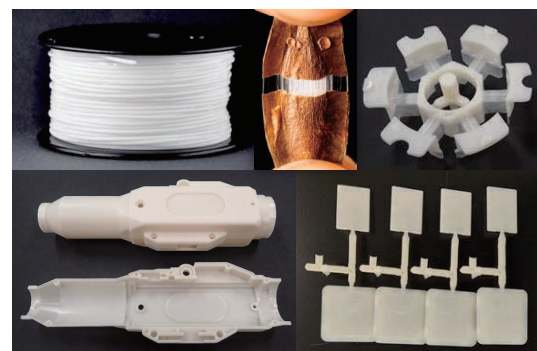
Starch-containing Bioplastics



Polysaccharide-containing Plastic Prototypes / Ocean Biodegradability of Developed Product



Plant Oil-based Bioplastics



Bioelastomer-based Plastics

Patent Japanese Patent No. 4942436, No. 5057874, No. 5495360

Treatise Uyama, Hiroshi, Functional polymers from renewable plant oils. Polymer Journal. 2018; 50:1003-1011. doi: 10.1038/s41428-018-0097-8

URL <http://www.chem.eng.osaka-u.ac.jp/mbbp/>

<https://www.kyu-gs.com/>

<http://www.chem.eng.osaka-u.ac.jp/~uyamaken/>

Keyword bioplastics, biomass plastics, marine biodegradable plastics, thermoplastic starch