



Development of novel bio-based materials with advanced properties

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Development of bio-based materials with advanced properties will enable continued progress and improve human life. The growing pressure for resolving ecological problems, but also to shift research toward circular economy, makes bio-renewable and biodegradable materials, such as poly(lactide) (PLA) very important. Given that a convenient approach can manipulate the structure of PLA at the molecular level, enables the development of different methods for the production of a wide range of PLA with suitable properties. The development of novel polymerization techniques allows the economical production of high molecular weight PLA, resulting in expanded use of PLA in packaging, medical or pharmaceutical applications, in agriculture to prevent freezing, as a system for self-healing of concrete and so on. The architecture of PLA based polymers can be modified by incorporating multifunctional monomers into the polymer chain in order to obtain bio-based materials with advanced properties. PLA can be designed to biodegrade within a reasonable timescale, which makes this polymer an ideal candidate for use in biomedical and pharmaceutical purposes. For drug delivery system, PLA was used as a nanofiber matrix (in dentistry) or microspheres carrier (for oral application). The potential that PLA is showing in newer applications in biomedicine, such as tissue engineering and wound healing, indicates that PLA will become an important material for the future high-value medical market. Special design of PLA nanofibers enables fine tuning of electrical and/or optical properties of PLA based conductive polymers which make them suitable for novel application. Such novel materials are coveted in various fields of biomedicine such as bioengineering, regenerative medicine, and biosensors, and consider as a good platform for future research.

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