

低纯度植物油单体衍生的环保塑料及其可持续回收

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摘要: 生物基环保塑料是一类新兴的可持续材料。合成性能优异的聚合物材料通常需要高纯度的生物物质单体, 然而高纯度单体的生产过程中并不“绿色”。另一方面, 为了环境保护, 人们迫切的希望塑料可以被回收再利用。在这里, 我们提出了一种简单而有效的策略, 从低纯度植物油单体设计和制备具有优异性能的聚酯酰胺 (PEA), 可以作为的生态塑料。选用植物油低纯度的 C21 二酸 (C21) 为主要单体, 采用一锅缩聚法合成高性能 PEA。所得到的 PEA 可以像热塑性塑料一样进行重复加工。更重要的是, PEA 可以在不牺牲其原有力学性能的情况下进行可持续回收, 包括物理回收、化学回收和复合材料回收。低纯度单体、可再加工和可持续回收的结合可以为开发新型环保塑料与传统塑料的竞争提供重要机会。

关键词: 环保塑料; 可持续回收; 聚酯酰胺

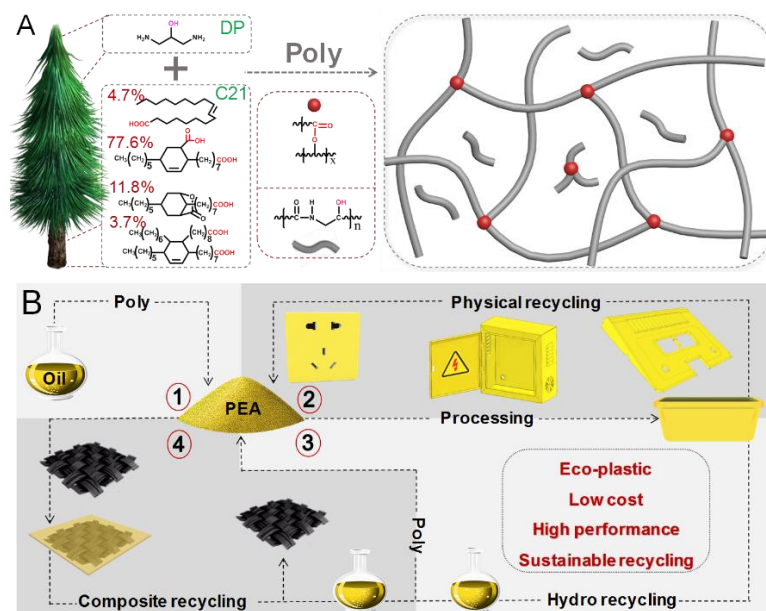


图 1 低纯度单体制备环保塑料及其可持续回收

Fig. 1 Preparation and sustainable recycling of environmentally friendly plastics from low purity monomers

Eco-plastics Derived from Low Purity Plant Oil Monomer and Their Sustainable Recycling

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Abstract: Biobased eco-plastics are an emerging class of sustainable materials. However, the synthesis of mechanically strong polymer materials usually needs high purity monomers derived from biomass, which is not

“green” during production. On the other hand, the recycling of plastics is highly desired for environmental protection. Here, we present a robust and facile strategy to design and prepare mechanically strong polyester amides (PEAs) from low-grade plant oils, that can be treated as real eco-plastics. Low-grade C21 diacid (C21) derived from plant oils was chosen as the main monomer to synthesize mechanical strong PEAs via a one-pot condensation polymerization process. The resulting PEAs can be processed like thermoplastics. More importantly, the PEAs can undergo sustainable recycling, including physical recycling, hydro recycling, and composite recycling, without sacrificing their performance. The marriage of low monomer purity, thermoplastic-like behavior, and sustainable recycling can provide vital opportunities for developing novel eco-plastics to compete with traditional plastics.

Key words: Eco-plastics; sustainable recycling; polyester amides