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Hop for Green Polymer Materials

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PURPOSE OF THE ABSTRACT

Polymers with their myriad functions are indispensable to any modern technology. Today, their production is largely based on fossil fuels. In view of their limited range, other sources are desirable on the long term. Beyond such considerations, renewable resources are also attractive as they can contain unique chemical structures. Particularly, terpenes and terpenoids feature thousands of different scaffolds. However, except for pinene, limonene and myrcene, there are few examples of other terpenes used for polymerization. To translate the structural elements of a given renewable resource into useful materials properties, appropriate synthetic methods are required.

Caryophyllene and humulene are among the most abundant and cheapest sesquiterpenes. They are found in many plants and fungi and a potential source is hop oil, with up to 25% of caryophyllene and 45% of humulene.

The direct polymerization of such compounds using ring opening metathesis polymerization, optionally complemented by exhaustive post-polymerization hydrogenation, yields non-crosslinked linear polymers with unprecedented microstructures reflecting the specific scaffolds of the feedstocks and with low glass transition temperatures in the range from -15 to - 50 °C. This polymerization can be performed either in bulk, pure oil or water dispersion.

FIGURES

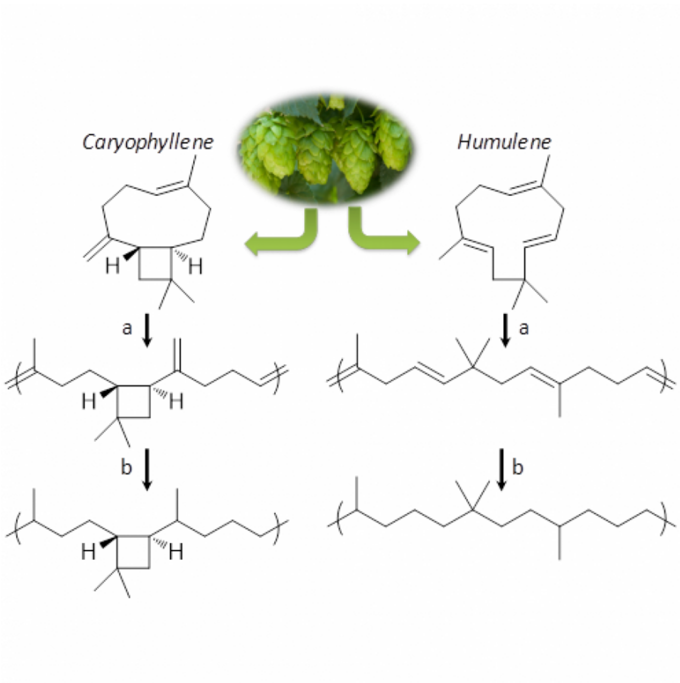

FIGURE 1

Synthesis of poly(caryophyllene) and poly(hydrocaryophyllene), left, and poly(humulene) and poly(hydrohumulene), right.

a: ROMP of the sesquiterpene; b: post-polymerization hydrogenation

FIGURE 2

KEYWORDS

Terpens | ROMP

BIBLIOGRAPHY

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