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Enzymatic synthesis of a new class of modular, tailor-made and bio-based lubricants

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PURPOSE OF THE ABSTRACT

In the chemical industry, the combination of biorenewability and biodegradability is becoming increasingly important. One of the industrial sectors in which this combination plays an important role is the lubricants sector. Conventional lubricants are typically produced based on petroleum. However, petroleum-based lubricants often have disadvantageous properties, such as poor biodegradability, thus resulting in a risk for the environment. In order to overcome such drawbacks, the synthesis of vegetable oil-based lubricants has been studied for years and the demand for biorenewable, biodegradable and economical lubricants is increasing.[1,2]

In this contribution we report on the design and development of a new class of modular, tailor-made and bio-based lubricants. For this purpose, we investigated the enzymatic oligomer synthesis starting from a bio-based building block in the presence of a lipase from Candida antartica. With this synthesis strategy, we were able to produce oligomers with defined chain length and tailor-made performance properties such as viscosity and pour point and, thus, have the possibility to modularly adapt certain properties of the lubricants. In addition, initial tests have shown that the resulting bio-based oligomers are biodegradable, thus underlining its potential as a sustainable alternative lubricant based on renewable resources.

FIGURES

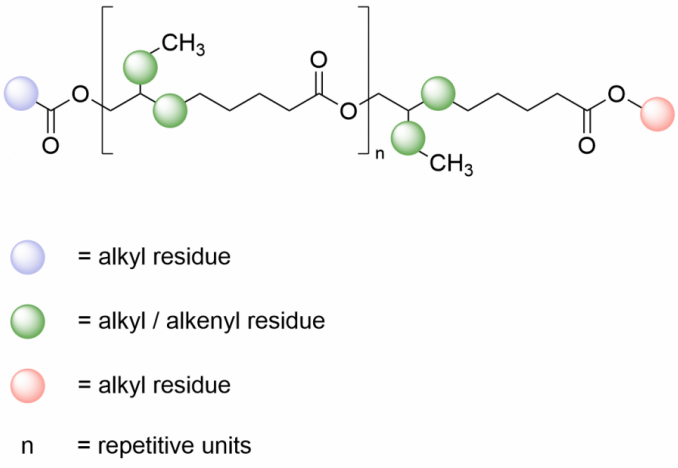

FIGURE 1
Lubricant structure
Modular, tailor-made and bio-based.

FIGURE 2

KEYWORDS
bio-based lubricants | biocatalysis | polymer synthesis | biodegradability

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