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From plant oils to plant foils: straightforward functionalization and crosslinking of natural plant oils with triazolinediones

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Plant oils, TAD chemistry, Alder-ene reaction, crosslinking, fatty acid functionalization

Abstract

With the aid of triazolinedione (TAD) chemistry, an additive-free, straightforward functionalization and crosslinking strategy for numerous plant oils was developed. In a first step, model studies on the most common natural fatty acids were performed with the aid of monofunctional TAD moieties. These equimolar functionalization reactions were readily monitored by NMR and MS analysis, further facilitated by the disappearance of the characteristic red colour of the TAD molecule. Then, a series of synthesized, bifunctional TAD molecules were used for the chemical crosslinking of crude plant oils, a process that was typically finished within minutes. In this way, a large variety of polymer networks could be obtained, such as plant oil-based foils, showing a wide range of thermal properties, which can be tuned and rationalised by the chemical structure of the different plant oils.

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