Preparation of Bio-Epoxides from Renewable Sources (Vegetable Oils)

Development status

Phase 2

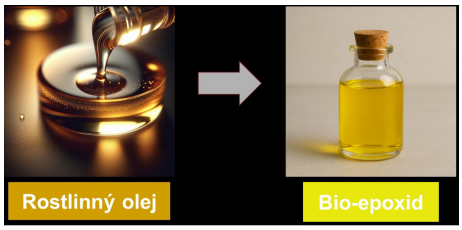
Feasibility study. There is a realistic design of the technology and the initial tests in the laboratory are leading to the specification of the technology requirements and its capabilities.

IP protection status

NA

Partnering strategy

Collaboration, licensing



Institution

UNIVERSITY OF PARDUBICE

University of Pardubice

Challenge

The epoxides prepared from renewable vegetable oils or their methyl esters serve as substitutes for similar substances derived from petroleum (in line with industrial decarbonization and the Green Deal 2025). These are non-toxic, colorless to slightly yellow liquids with low viscosity. Epoxides are used as additives in lubricants (loss lubricants), but primarily as raw materials for the production of other substances or their components, such as: biopolymers, reactive solvents, synthetic paints, polycarbonates. The starting raw material is a renewable source – vegetable oil. An additional advantage is the production of glycerol as a valuable commodity, which is used in many fields (pharmaceuticals, cosmetics, chemistry, tobacco industry, explosives). Along with glycerol, methyl esters of fatty acids are always produced, which are currently used as fuel. With the potential decline in the number of combustion engines, it will be necessary to find new uses for them.

Description

The technology describes the process of converting methyl esters of higher fatty acids into the corresponding epoxides, using hydrogen peroxide and formic acid as a catalyst. The proposed model linking product parameters with reaction conditions was designed to allow the adjustment of epoxidation conditions for various input methyl esters. The resulting product can then be tailored to meet specific customer requirements, such as the degree of epoxidation, reduction in iodine value, epoxy index, and viscosity. An advantage of the proposed process is its flexibility—it can be applied to methyl esters derived from any types of vegetable oils and can be scaled up.

Commercial opportunity

The technology can be offered to methyl ester producers as an alternative application, as well as to manufacturers of polymer

materials in the paint industry.