New bio-composite materials that help to reduce CO_2 footprint

from the functionalization of cellulose

DISRUPTIVE TECHNOLOGY

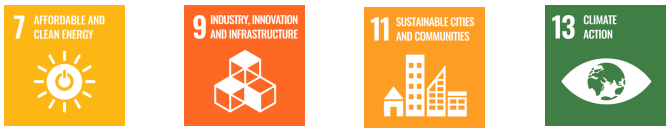
A procedure for the preparation of a conjugate between poly(limonene carbonate) (PLC) and cellulose, which is a **high versatile and eco-friendly** medium for the manufacture of new materials, such a rubber-type materials and bio-based plastics. The present invention also refers to this conjugate (i.e: PLC functionalized cellulose) and their use in the preparation of **crosslinking materials and bio-based plastics.**

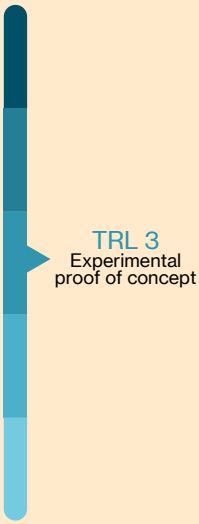
PROBLEM SOLVING

Most plastic derived materials are produced from fossil fuels. The EU aims to have net-zero greenhouse gas emissions by the year 2050 – thus **carbon-neutral economy.** The present invention introduces vegetable-derived constituents in plastics, such as cellulose or limonene, a monomer found in the peels (a waste) of citrus fruits. Furthermore, carbon dioxide, the most prominent greenhouse-effect gas, is captured and valorised with this technology, since it is consumed in the formation of poly(limonene carbonate) (PLC). In particular, the technology is focused in the use of cellulose covalently bounded to PLC to form a bio-conjugate, which is cross-linked within a polymeric matrix in a subsequent step, which provides a bio-composite material. Said bio-composites can find application as bio-sourced sealants, or light, load-bearing materials.

ADVANTAGES

- Use of circular materials: CO_2 and waste by-product of the agriculture or food industry.
- Application as green sealant or reinforced material (composites) of the final product.
- Alternative to the oil-based materials for greener applications and according to the circular economy.
- Valorisation of CO_2 emissions contributing to climate action policies through the fixation of the CO_2 molecule in the polymer material.





IP STATUS

EP Patent Application EP24382310.1

BUSINESS MODEL

Licensing (methodology); partner for joint development and/or commercialisation

TARGET MARKET

Sealants, plastics or reinforced materials manufacturers, with a lower carbon footprint

KEYWORDS

Cellulose, polymers, sealants, materials, circular economy, CO_2, climate change, environment, R&D chemicals

AVAILABILITY

Free to negotiate

Needs

- Optimization and scale-up of PLC route.
- Scale-up of bio-conjugate.

Milestones

- Raw material supply.
- Scale up reactions.
- Benchmarking of material performance.

Requirements

- Investment in production plant.

Roadmap

- Development of commercial process to ensure industrial supply of raw material.
- Scale-up validation with industrial partner.
- Material product validation with industrial partner.

ICIQ Knowledge and Technology Transfer