Technology Offer CSIC/IG/142

Sustainable γ-valerolactone Production via Photothermal Catalysis

Novel and sustainable photothermal catalytic method for synthesizing γ-valerolactone (GV with applications as biofuel, green solvent for the pharma industry, precursor for polymers and perfumery. The process utilizes biomass feedstocks and new scalable nickel-based catalysts that significantly reduce the energy requirements and avoiding H_2 gas.

Intellectual Property

European priority patent

Intended Collaboration

Licensing and/or co-development

Stage of development

TRL3

Contact

PhD Isabel Gavilaes Pérez

Vice-presidency for Innovation and Transfer

Isabel.gavilanes@csic.es
comercializacion@csic.es

Market need

GVL is a bio-based chemical with remarkable industrial potential, primarily due to its derivation from renewable biomass and its versatile properties as a green solvent, fuel additive, and chemical precursor. GVL is poised to replace traditional, hazardous solvents in sectors like pharmaceuticals, agrochemicals, and fine chemicals. Furthermore, it can be catalytically converted into a range of valuable products, including high-energy liquid fuels, polymers, and other specialty chemicals. GVL is a key player in the transition toward a more sustainable and bio-based economy. However, traditional methods for GVL synthesis involve harsh energy intensive conditions or fossil-derived inputs, limiting the environmental and economic viability.

Proposed solution

Sustainable alternative to conventional γ-valerolactone synthesis by efficient photothermal production via scalable and cost-effective Ni-based catalysts without H2 gas, at lower reaction temperature and in shorter time.

Synthesis based on renewable feedstocks, reducing dependence on fossil-derived chemicals.

It presents reduced energy consumption compared to traditional hydrogenation processes and compatibility with solar synthesis.

Competitive advantages

- Reduced synthesis cost: lower temperature, pressure and reaction time
- Elimination of the H2 gas in the hydrogenation reaction
- Compatible with solar synthesis (zero energy cost)
- Low cost and scalable Ni-based photothermal catalyst with broadband absorption covering the whole solar spectrum
- Circular economy: transforming biomass residues into high value chemicals