GLAMOUR

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GLAMOUR PILOT PLAN

Celebrating a significant milestone, our project proudly introduces a TRL5-scale prototype meticulously designed and constructed at TU Eindhoven. This remarkable development seamlessly integrates auto-thermal chemical looping reforming with a cutting-edge Fischer-Tropsch reactor. This pioneering system features a trio of reactors, precise temperature and pressure control, and exceptional gas-handling capabilities, cementing its status as an invaluable asset for advanced chemical processes.

Discover more reading the 7th issue of the GLAMOUR newsletter!

An auto-thermal chemical looping reforming based on glycerol integrated with a Fischer-Tropsch reactor was successfully designed and built at TRL5 scale in TUE. The prototype is aimed at producing 0.5 kg/h kerosene as a high value-added product from a maximum of 2.5 kg/h of glycerol feedstock as a by-product of biodiesel production under 1000 hrs of operation.

The setup consists of three reactors including two reactors for chemical looping process and one reactor for Fischer-Tropsch process. The chemical looping reforming (CLR) reactors can be operated at pressures and temperatures maximum up to 30 bar and 1000 °C. The temperature in the reactors is controlled using a thermocouple positioned close to the center of the vessels to ensure stable conditions. Each CLR reactor is heated with two ovens each oven has a 5-kW heating capacity. A high-temperature circulator unit working with hot oil is used to heat FT reactor and bring the reactor to reaction temperature condition of approximately 220° C.

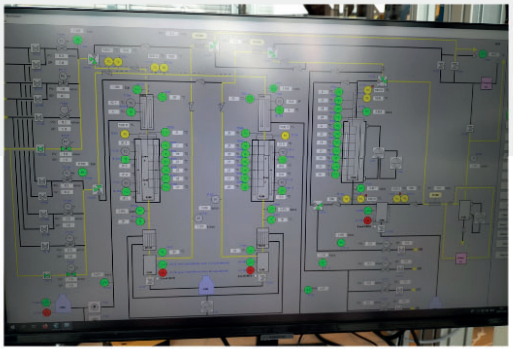
The setup gas feeding system consists of 12 mass flow controllers (8 for the CLR reactors, 4 for the FT one), providing us with exceptional flexibility in utilizing various gases for the reduction and reforming cycles. The setup is equipped to handle gases such as H_2, CH_4, CO, CO_2, N_2, and air.

A multitude of temperature sensors, pressure sensors, two-way and three-way valves, check valves, and needle valves have been integrated throughout the setup. These instruments and components serve various functions, enabling precise monitoring, control, and adjustment of temperature, pressure, and fluid flow within the system.

The entire setup operates at a pressure of 30 bar, necessitating the installation of three back pressure regulators to maintain the desired system pressure. Given the high-pressure operation, numerous pressure transmitters and pressure relief valves have also been incorporated to monitor and regulate the pressure within the setup effectively. Two vaporizers with a power rating of 10 kW each have been installed atop the reactors, effectively evaporating the liquid feed. To analyze the syngas product, a compact GC (Gas Chromatograph) has been designated and positioned within the setup. This GC serves the purpose of conducting a comprehensive analysis of the syngas. Additionally, a second GC is located on the ground floor, intended for analyzing the product of the Fischer-Tropsch (FT) reactor.








Want to know more about GLAMOUR?
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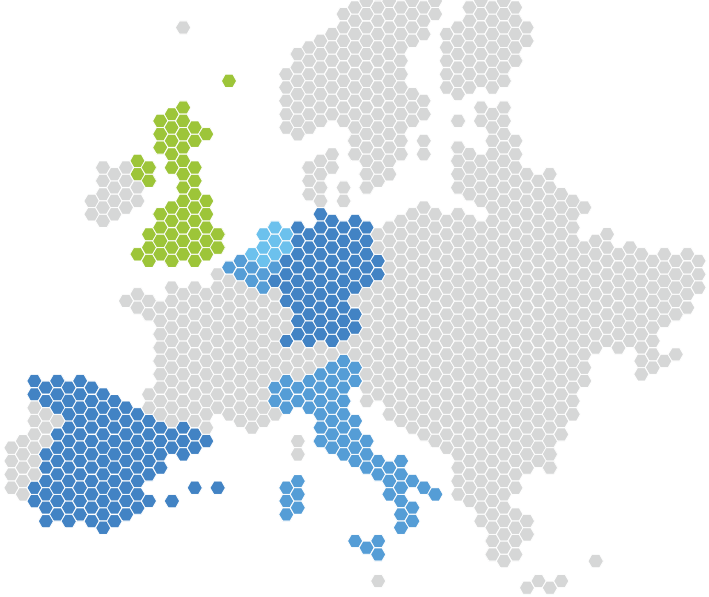
CONSORTIUM



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 884197