European Training Network for Continuous Sonication and Microwave Reactors (COSMIC)

Resumen:

The European chemical industry faces some very serious challenges if it is to retain its competitive position in the global economy. The new industries setting up in Asia and the Near East are based on novel process-intensification concepts, leaving Europe desperately searching for a competitive edge. The transition from batch to continuous micro and milliflow processing is essential to ensure a future for the European fine-chemicals and pharmaceuticals industries. However, despite the huge interest shown by both academia and industrial R&D, many challenges remain, such as the problems of reaction activation, channel clogging due to solids formation and the scaling up of these technologies to match the required throughput. COSMIC, the European Training Network for Continuous Sonication and Microwave Reactors, takes on these challenges by developing material- and energy-efficient continuous chemical processes for the synthesis of organic molecules and nanoparticles. The intersectoral and interdisciplinary COSMIC training network consists of leading universities and industry participants and trains 15 ESRs in the areas of flow technology, millifluidics and external energy fields (ultrasound and microwaves). These energy fields can be applied in structured, continuous milli-reactors for producing high-value-added chemicals with excellent yield efficiencies - in terms of throughput, waste minimization and product quality - that simply cannot be achieved with traditional batch-type chemical reactors. The chemical processes that are at the heart of COSMIC's game-changing research are catalytic reactions and solids-forming reactions. COSMIC's success, which is based on integrating chemistry, physics and process technology, will re establish European leadership in this crucial field and provide it with highly trained young experts ready for dynamic careers in the European chemical industry.

Objetivos:

Formation and scientific exchanges in the topics of reactor engineering, continuous flow processes, microwaves and ultrasounds both from the design of new nanomaterials, organic reactions and catalysis and reaction processes.

Objectivos contribución:

To study the application of ultrasound and/or microwaves for the synthesis of nanoparticles. To study these interactions in both standard and flow conditions. To optimize the chemical conditions in these processes. To characterize the obtained solid products in terms of their role in catalytic or health applications.

Entregables:

5.1 15 Personal career development plans
5.5 Secondments for 15 ESRs (at least one intersectorial per ESR).
5.6 Training progress report
5.7 Training final report
6.1 First paper by ESR1-15
6.2 Second paper by ESR1-15
6.4 Confidential report per ESR, summarising all results (delivering on milestones, as a preparation for PhD).
6.615 PhD degrees awarded

Impacto:

COSMIC is the first-ever training programme dedicated to chemical process intensification based on the application of ultrasound and microwaves in flow reactors.

COSMIC provides an in-depth scientific training from experts at the intersection of a number of conventional and emerging technology areas, related to process intensification by ultrasound- and/or microwave-enhanced continuous processing for organic and nanoparticle synthesis.

COSMIC will greatly enhance the career prospects and employability of the ESRs. The COSMIC ESRs can be employed by industry, research institutes and governmental bodies.

The non-academic COSMIC participants are involved at the highest level of the training programme and play a key role in the supervision of the ESRs (e.g., the industrial supervision of secondments). COSMIC fosters a tight interconnection of cutting-edge European research institutions, several world-leading scientists and leading companies in the fields of process intensification, microwave and ultrasound technology.

COSMIC not only aims at new developments in the medium term in flow chemistry and external energy actuation, but also at strengthening the process-intensification professional networks at the EU level (incl. the EFCE Working Party on Process Intensification, the Intensified Flow Separator Infrastructure and Expertise (INSPIRE) Network of Infrastructure funded by the EIT-KIC Raw Materials) and other current EU projects

Presupuesto: 2,700,000

Equipo de investigación

Nombre: Nanoquímica y Valorización de Biomasa y Residuos (NANOQBIORES)
Email: qo1rorea@uco.es
PAIDI: FQM-383
Investigador principal: Rafael Luque (PARTNER)
Email: q62alsor@uco.es
Presupuesto del equipo: 226,273.00

Universidad: Universidad de Córdoba

Enlace: http://cosmic-etn.eu/

Estado: published

Contacto Solicitar más información de European Training Network for Continuous Sonication and Microwave Reactors