Simultaneous transformation of ambient heat and undesired vibrations into electricity via nanotriboelectrification during non-wetting liquid intrusion-extrusion into-from nanopores

Fact Sheet

Project Information

Electro-Intrusion
Grant agreement ID: 101017858

Status
Ongoing project

Start date 1 January 2021
End date 31 December 2024

Funded under
H2020-EU.1.2.2.

Overall budget
€ 3 651 381,25

EU contribution
€ 3 651 381,25

Coordinated by
CENTRO DE INVESTIGACION COOPERATIVA DE ENERGIAS ALTERNATIVAS FUNDACION, CIC ENERGIGUNE FUNDAZIOA
Spain

Objective

Greenhouse gas emissions, pollution and rational energy use are civilization-scale challenges which need to be resolved urgently, in particular by the conversion of abundant waste heat and undesired vibrations into useful electricity. However, the low efficiency of existing conversion methods does not provide an attractive solution. Here we propose a new and highly efficient method and apparatuses for the
simultaneous transformation of mechanical and thermal energies into electricity by using zero-emission nanotriboelectrification during non-wetting liquid intrusion-extrusion into/from nanoporous solids. To tackle these phenomena, we bring together a consortium of multidisciplinary teams specializing in physics, chemistry, material science and engineering to address the project by the state-of-the-art methods of MD simulations, high-pressure calorimetry and dielectric spectroscopy, materials synthesis and characterization, and prototype development. The FET-PROACTIVE call is a key solution to bring this early stage multidisciplinary concept to higher TRLs, fill in the large knowledge gaps in the solid-liquid contact electrification and heat generation during intrusion-extrusion as well as enable its full impact on EU innovation leadership, competitive market and energy sector security. The proposed method can be used for energy scavenging within a wide range of technologies, where vibrations and heat are available in excess (train, aviation, domestic devices, drilling, etc.). In particular, using European Environment Agency data we estimate that the use of the proposed approach only within the automobile sector can reduce the overall EU electricity consumption by 1-4% in 2050. With this regard, the final stage of the project implies regenerative shock-absorber development and field-testing for a drastic maximization of the maximum range of hybrid / electric vehicles.

Field of science

/social sciences/social and economic geography/transport/electric vehicles

Programme(s)

H2020-FETPROACT-2020-2

Funding Scheme

RIA - Research and Innovation action

Coordinator

CENTRO DE INVESTIGACION COOPERATIVA DE ENERGIAS ALTERNATIVAS
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Activity type: Research Organisations
EU contribution: € 871 665

Website
Contact the organisation

Participants (5)

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Activity type: Higher or Secondary Education Establishments
EU contribution: € 558 000

Website
Contact the organisation

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Activity type: Higher or Secondary Education Establishments
EU contribution: € 359 925

Website
Contact the organisation

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Activity type: Higher or Secondary Education Establishments
EU contribution: € 435 602,50

Website
Contact the organisation
THE UNIVERSITY OF BIRMINGHAM

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EU contribution

€ 746 001,25

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Activity type

Higher or Secondary

Education Establishments

Contact the organisation

TENNECO AUTOMOTIVE EUROPE BVBA

Belgium

EU contribution

€ 680 187,50

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Activity type

Private for-profit entities
(excluding Higher or Secondary Education Establishments)

Contact the organisation

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