

CETEM

Technical Research Centre of Furniture and Wood of the Region of Murcia

PURELY

PROJECT

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Polyurethane foam recycling technology through green chemistry catalysis

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Why?

Flexible polyurethane foams (FPUF):

- Widely used in different sectors.
- Optimal properties for isolation, confort, cushioning…



EUROPEAN UNION DATA

Production: 1.1 million T/year

Waste/year: 675.000 T

- Landfill **49%**
- Burning **34%**
- Recycling **17%**

65% EU: FPUF waste management is a priority to achieve the reuse and recycling objectives of household waste (Landfill Directive (2018/850/EC)):

>55% in 2025
60% in 2030
65% in 2035

[1] Remaking the bed: mattress recycling

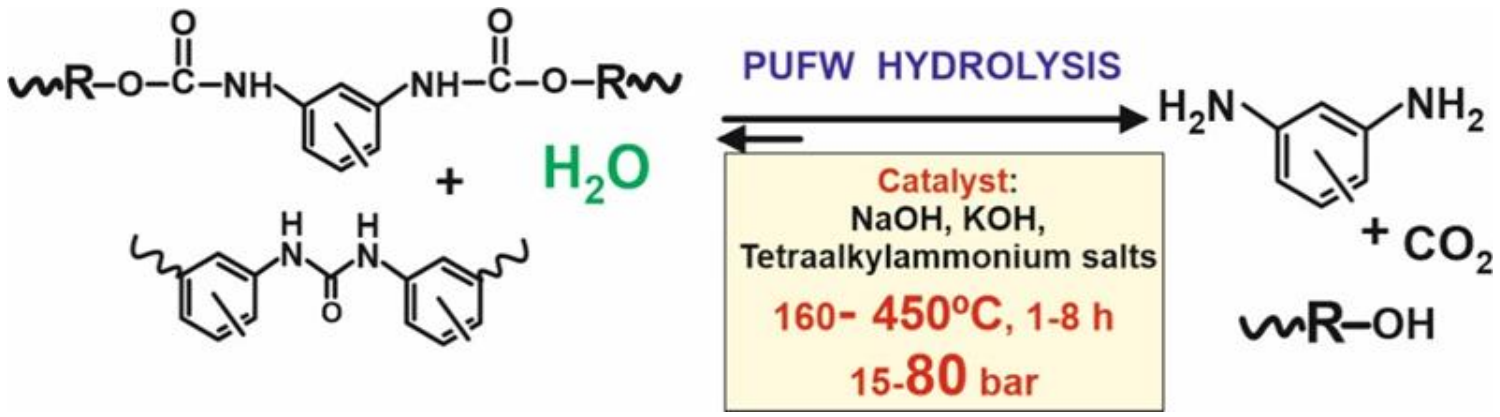
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Project objective

Start: October 2024
End: September 2027

Develop a sustainable, efficient and versatile technological solution for recycling flexible polyurethane foam so that it can be reused to produce new flexible polyurethane foams.

PURELY technology

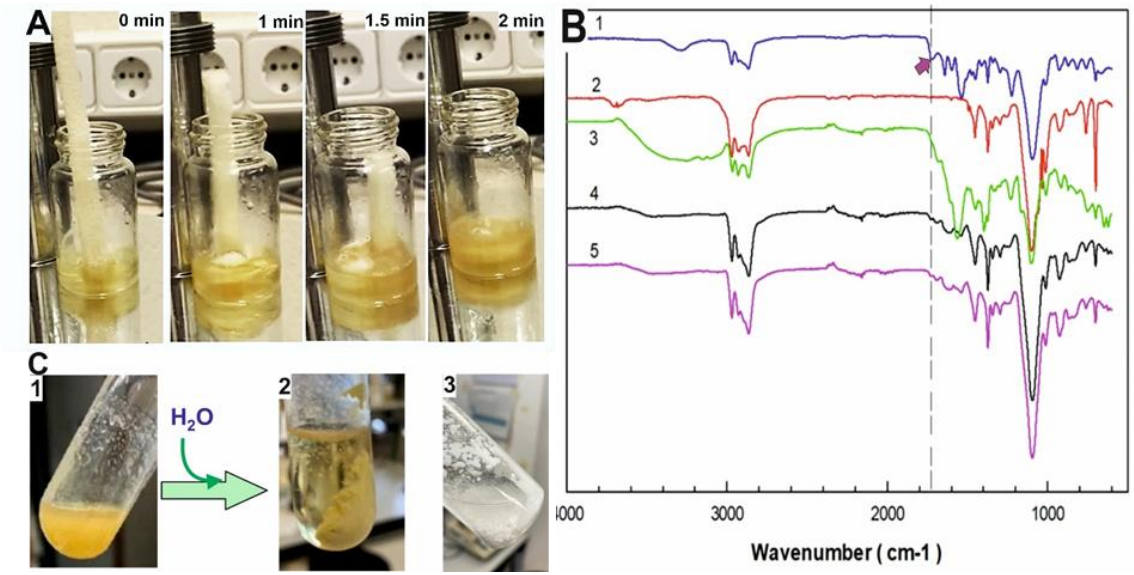


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PURELY technology: what is it?

Green chemistry-based catalytic FPUF depolymerisation process, international patent currently pending

(WO/2024/013423, PCT/ES2023/070452; P202230649)



Advantages over glycolysis

- Hydrolytic process
- Mild operational conditions
- Short reaction times
- Easy product purification
- No undesirable by-products

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Partners

	Rol in PURELY project
interplasp espumas de poliuretano Europe's largest producer of FPUF	Investigate the incorporation of recycled materials into new FPUF formulations
GOMARCO World's 4th-largest bedding products manufacturer	Develop a mattress prototype using FPUFs that incorporate recycled materials
UNIVERSIDAD DE MURCIA Group on Sustainable Chemistry at the University of Murcia, expert in novel and sustainable catalytic depolymerisation	Optimise critical reaction variables in PURELY technology
UJI UNIVERSITAT JAUME I Group on Sustainable and Supramolecular Chemistry at Jaume I University, experts in neoteric solvents and alternative catalysts	Adapt and reproduce PURELY technology with different types of FPUF waste
CETEM Technological Research Centre of Wood and Furniture, expert in FPUF technology	Implement PURELY technology on a pilot scale

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Project strategy

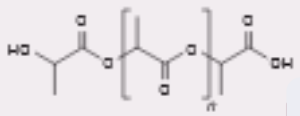
FPUF

LABORATORY

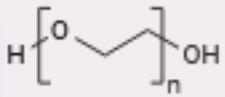
1. PURELY TECHNOLOGY OPTIMIZATION

2. PURELY TECHNOLOGY ADAPTATION TO DIFFERENT FPUF FORMULATIONS

1-2 L



RECYCLED MATERIALS



3. INCORPORATION OF RECYCLED MATERIALS INTO FPUF

NEW FPUF

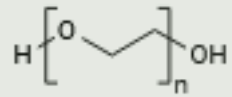
FPUF

SCALE-UP

PT 4. PILOT-SCALE DEVELOPMENT AND OPERATIONAL VALIDATION

25 L

RECYCLED MATERIALS



NEW PRODUCTS

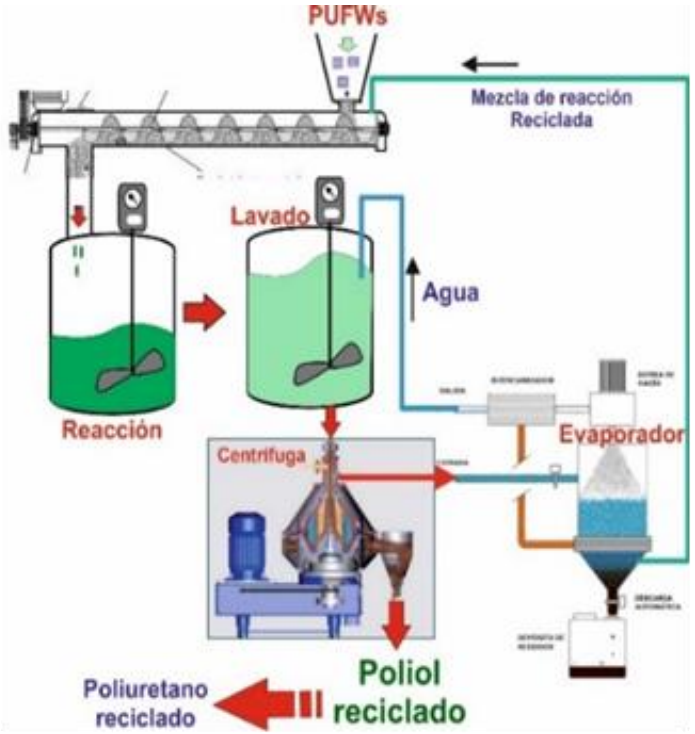


PT 5. PROTOTYPE DEVELOPMENT AND VALIDATION

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Expected results and potential applications

1. **PURELY Recycling Technology**
   - Sustainable catalytic recycling process for FPUFs
   - Potential adaptation to other plastic wastes
2. **Recovered Depolymerization Products**
   - Reuse in new FPUF synthesis processes
   - Potential application in other chemical formulations
3. **New Recycled FPUF Formulations**
   - Development of sustainable FPUF formulations
   - Adaptable properties for multiple applications
4. **Recycled-Content FPUFs**
   - Applications in bedding and upholstery sectors
   - Potential extension to automotive and footwear industries
5. **Sustainable Mattress Prototype**
   - Mattress manufactured from recycled FPUFs
   - Targeted for domestic and hospitality applications
   - Aligned with circular economy and sustainability demands





MINISTERIO DE CIENCIA E INNOVACIÓN

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Plan de Recuperación, Transformación y Resiliencia

AGENCIA ESTATAL DE INVESTIGACIÓN

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¡THANK YOU!

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