

## DISSEMINATION

At mid-term of the project, SUPERMET was presented at 7 scientific congresses and 1 international workshop. Fields addressed were chemistry, supercritical fluids, polymers, carbon dioxide utilization, analytics. Regions covered were Europe, Asia and South America.



### Project Team

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**SUPERMET**  
PROJECT

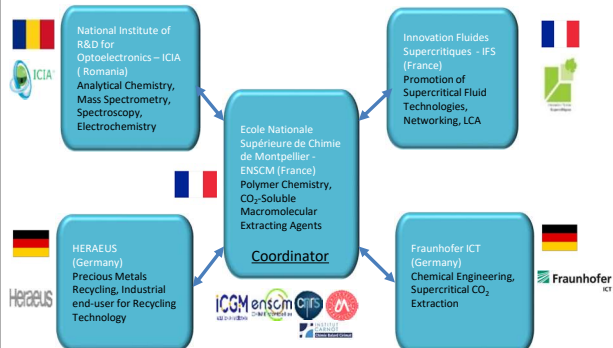
Recovery of  
Raw materials from  
End-of-life products



36-Month project (2018-2021) 1.5 M€, in the frame of the ERA-MIN 2 joint call 2017 co-funded by the Horizon 2020 program of the European Union.



## CONSORTIUM



## OVERVIEW – MAIN TARGETS

**Context:** Precious metals (PGMs) such as **palladium Pd** or **platinum Pt** are used extensively in applications for catalysis in fields such as the petrochemistry, the automotive and the synthesis of fine chemicals. The **scarcity of these metals** poses a risk for the European countries which do not have this primary resource.

**Objective:** Develop an **eco-friendly disruptive extraction** technology for the recycling of precious metals, especially (Pd) and (Pt), from spent catalysts using supercritical CO<sub>2</sub> (scCO<sub>2</sub>) extraction assisted with complexing polymers.

**Technology used:** Synthesis of **copolymers soluble in supercritical CO<sub>2</sub>** for complexation of PGMs. Supercritical fluids techniques are generating a minimum of secondary effluents and operating in mild conditions of temperature compared to conventional routes.

## PRELIMINARY RESULTS

12

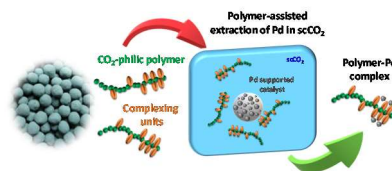
- 12 **Catalysts** delivered to partners and **characterized**
- 3 Virgin, 4 virgin pre-treated and 5 spent catalysts

18

- 18 **Copolymers** synthesized
- 12 being significantly soluble in scCO<sub>2</sub>, with **metal-complexing units**
- Able to interact with **PGMs or heavy metals**

145

- 145 **Supercritical CO<sub>2</sub> extraction tests** performed
- At **lab-scale** up to **2 g** of catalyst tested
- Mild-conditions** used : 40 °C – 250 bars



The experiments proved the possibility to **extract up to 73% of Pd** from aluminosilica-supported Pd catalyst.

Operating conditions : scCO<sub>2</sub> (40 °C, 250 bar)



### NEXT – STEPS :

- Optimization of extraction conversion & recovery of the extracted Pd
- Scale-up to 10 g – 50 g - 100 g
- Technico-economical study
- Comparative Life Cycle Assessment