



**MONOLITHOS**

**COMPANY  
PROFILE**

Athens, March 2017

# MONOLITHOS

## MONOLITHOS AT A GLANCE

**LOCATIONS:** HEAD OFFICE: Vrilissou 83, 11476 Athens  
PRODUCTION: Anonymou 5, 10442 Athens  
DISTRIBUTION N. GREECE: Peston 58, Thessaloniki

**LICENSING:** PRODUCTION OF EMISSION CONTROL DEVICES (CATS, DPFS)  
COLLECTION, TRANSFER, TEMPORARY STORAGE  
PRE-PROCESSING AND ASSAYING OF SPENT CATALYSTS

### CLIENT PORTFOLIO

**1025 Greek Professional Automotive Workshops Clients for aftermarket products**

**1335 Greek Suppliers of spent automotive catalysts for recycling**

### ECONOMICAL FIGURES

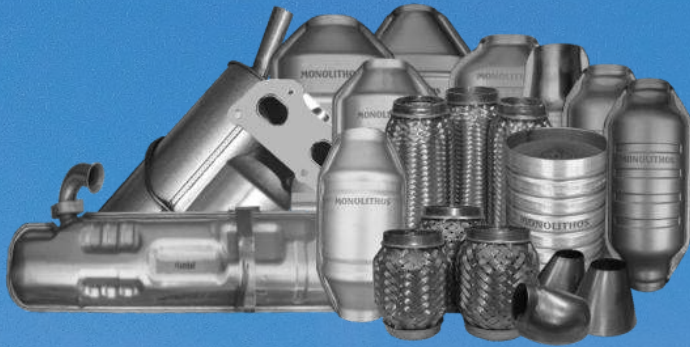
**All domestic and foreign suppliers are being paid in advance (*zero open accounts to suppliers*)**

**Bank Loan/Revenue: 13.4%**

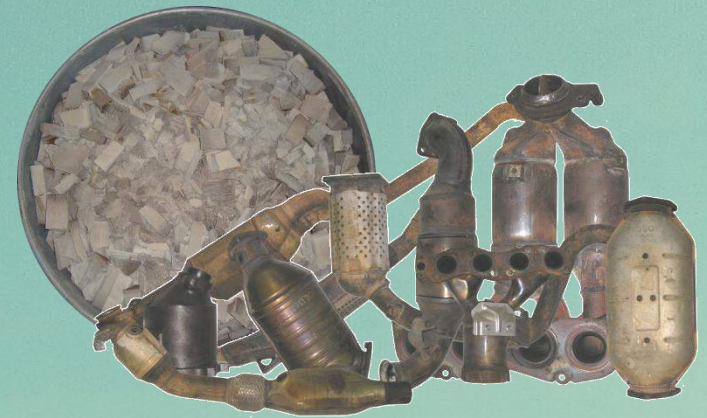
**Exports to Europe: 35.7 % of Total Revenue**

# COMMERCIAL ACTIVITIES

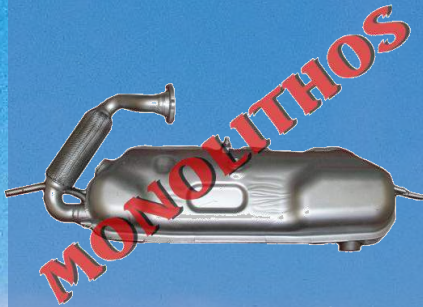
# MONOLITHS



**Automotive  
Catalytic Converters  
& Diesel  
Particular Filters (DPFs)  
Manufacturing**



**Recycling &  
Assaying of  
Platinum  
Group Metals**



**Diesel Particular Filters  
(DPFs)  
& Selective Catalytic  
Reduction Systems  
(SCRs)  
Regeneration**

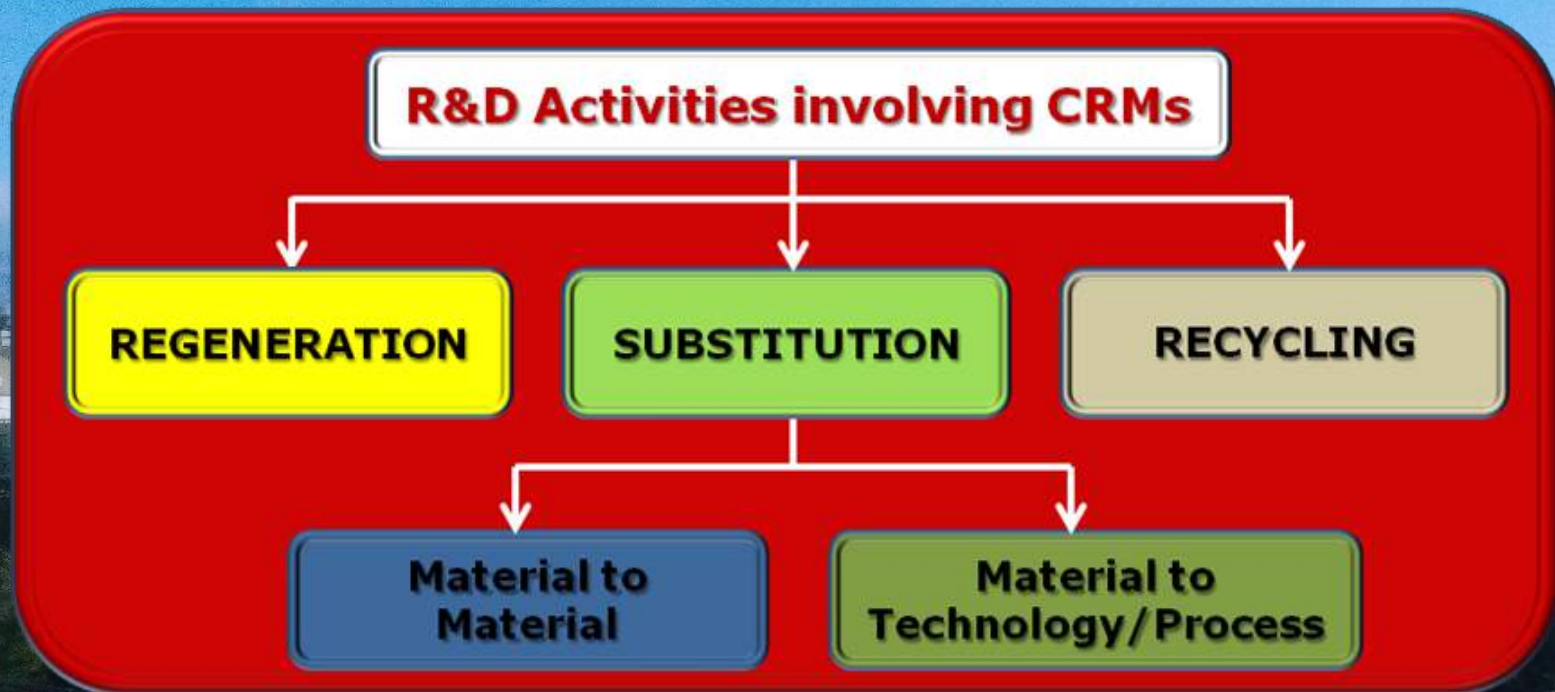


**Marine &  
Stationary  
Catalytic  
Applications**



**Heavy  
Duty  
Applications**

**MONOLITHOS<sup>®</sup>** products incorporate two families of critical raw materials (CRMs), namely noble metals (*Platinum, Palladium, Rhodium, Gold, etc.*) and rare earths (*Lanthanum, Cerium, etc.*)



## ACTIVITIES

- Development of precious metals nanoparticles.
- Development of transition metals nanoparticles.
- Development of catalytic hollow-fibers/nanotubes/membranes.
- Regeneration of Catalytic Converters and DPFs.
- Ageing of Catalytic Converters and DPFs.
- Recycling and assaying of precious metals and rare earths from secondary raw materials.
- Small scale recycling facilities for noble metals and rare earths.

## INTERESTS

- Substitution of precious metals by transition metals nanoparticles in catalytic washcoat.
- Novel catalytic porous honeycombs
- Platinum-Free and PGM-Free Fuel Cells Catalysts
- Particulate filters for gasoline engines (Euro 6c)
- Emission control devices for Stationary Applications (Furnaces, Power Generators, etc.)
- Cost-Effective Recycling processes for noble metals and rare earths
- CO<sub>2</sub> capture, separation and catalytic transformation to fuels



PLATIRUS:  
PLATINUM  
GROUP METALS  
RECOVERY  
USING  
SECONDARY  
RAW MATERIALS

*The project is being funded under SC5-13 call of Horizon 2020.*

<http://www.platirus.eu/>

## PROMETHEUS

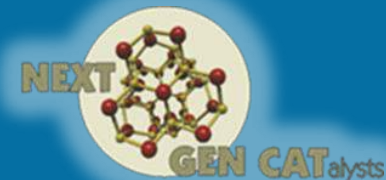
PROMETHEUS:  
PLATINUM  
GROUP METALS  
SAVING BY  
MONOLITHOS  
EFFICIENT &  
DISRUPTIVE  
CATALYST  
INNOVATION

*The project is being funded under SME Instrument (Phase I) call of Horizon 2020.*

## CO2MPRISE

CO2MPRISE:  
CARBON  
DIOXIDE  
ABSORBING  
MATERIALS  
PROJECT RISE

*The project is being funded under H2020-MSCA-RISE-2016 call of Horizon 2020.*



NEXTGENCAT:  
DEVELOPMENT  
OF NEXT  
GENERATION  
COST EFFICIENT  
AUTOMOTIVE  
CATALYSTS

*The project was funded under FP7-NMP-2011-Small-5.*

<http://www.nextgenecat.eu/>

# COST NETWORKING ACTIONS (H2020) **MONOLITHOS**



SOLUTIONS FOR  
CRITICAL RAW  
MATERIALS UNDER  
EXTREME CONDITIONS  
(CRM-EXTREME)

***The Network is being  
funded under EU  
COST Action A15102.***

<http://www.crm-extreme.eu/>



INTERDISCIPLINARITY  
IN RESEARCH  
PROGRAMMING AND  
FUNDING CYCLES  
(INTREPID)

***The Network is being  
funded under the EU  
COST Action Initiative  
TD 1408.***

<http://www.intrepid-cost.eu/>



NETWORK ON  
TECHNOLOGY-CRITICAL  
ELEMENTS - FROM  
ENVIRONMENTAL  
PROCESSES TO HUMAN  
HEALTH THREATS

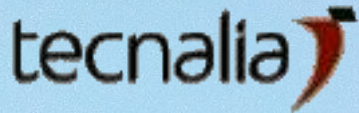
***The Network is being  
funded under the EU  
COST Action Initiative  
TD 1407.***

<http://www.costnotice.net/>



# R & I COLLABORATORS

# MONOLITHOS



Johnson Matthey



CENTRO  
RICERCHE  
FIAT



UNIVERSITÀ  
POLITECNICA  
DELLE MARCHE



Env-Aqua Solutions



UNIVERSITÀ DEGLI STUDI DI SASSARI



## PUBLICATIONS

- I. Yakoumis et al., 2016, "Tubular C/Cu decorated  $\gamma$ -alumina membranes for NO abatement", Journal of Membrane Science, doi:10.1016/j.memsci.2016.05.047
- G. Kolliopoulos et al., 2014, "Behaviour of platinum group metals during their pyrometallurgical recovery from spent automotive catalysts", OALib Journal, doi: 10.4236



## INVITED LECTURES

- Lisbon Training Scholl (6-7/2/2017), Lecture title: "Financing innovative SMEs in the area of critical raw materials".
- 2016 EMRS (European Materials Research Society) Spring Meeting, Lecture title: "Substitution and Recycling of Critical Raw Materials from Catalytic Emission Control Devices in the Automotive Sector".
- 21st International Workshop of TACEC Programme, 2014, Lecture title: "How to treat catalyst to recover precious metals and rare earths".
- University of Padova, 2014, Lecture title: "Critical Materials and Automotive Catalytic Converters: From substitution to recycling".

## KEY-NOTE CONFERENCE PRESENTATIONS

- 2<sup>nd</sup> International Conference and Expo on Separation Techniques (26-28/9/2016, Valencia, Spain), "Towards Hollow Fibers Automotive Catalytic Converters: Effect of Carbon on the NO Abatement efficiency of Cu decorated C/Al<sub>2</sub>O<sub>3</sub> Porous Hollow Fibers".
- Conference "International Days in Critical Raw Materials", Burgos (Spain, 25-26/6/2015), "Catalytic mono-channeled monoliths to substitute PGMs by Cu nanoparticles for Automotive Applications".

