

## ReDuCe – Use of Disposable Mask Residues in Composites with Various Formulations

### Summary

The COVID-19 pandemic has significantly changed several socio-economic aspects such as people's lifestyle, economy, work, and education. Around the world, public policies adopted the mandatory use of face masks. The value of imports of face masks has grown exponentially in the European Union from €800 million in the first half of 2019 to €14 billion in the first half of 2020.

The improper disposal of face masks composed mainly of polymeric materials can have several negative impacts on the environment. Plastics and microplastics can end up in streets, landfills and waterways, reaching the sea, and often end up in the food chain (Figure 1).



Figure 1. Examples of improper disposal of face masks IIR.

The ReDuCe project aims to reduce microplastics and plastic pollution by incorporating the plastic materials from the face masks in different binders (cement, plaster, lime). This project will address this societal challenge by investing in the circular economy. Several objectives will be set:

- Decontamination of the face masks.
- Measurement of the incorporation ratio of decontaminated mask residues in composites of different binders.
- Performance, durability, and ecotoxicological risks of the most promising formulations.
- Assessment of environmental and economic sustainability in the production of these construction solutions.

In the long term, the project's objective is to develop products with a good price/performance/sustainability ratio, capable of competing with the existing constructive solutions.

As scientific outputs of the ongoing project, two reports were elaborated, an oral presentation on a Congress TEST&E 2022 - 3<sup>rd</sup> Conference on Testing and Experimentation in Civil Engineering, Smart Technologies, and collaboration on the event: "Semana dos Parceiros do Roteiro das Minas e Pontos de Interesse Mineiro e Geológico de

Portugal" ("Portugal's roadmap with geological and mining points of interest") where it was proposed a scientific and aesthetic visual journey into the interior of rocks and minerals, microfossils, aquatic microorganisms, microplastics, awaking curiosity, creativity, and ecological awareness (Figure 2).

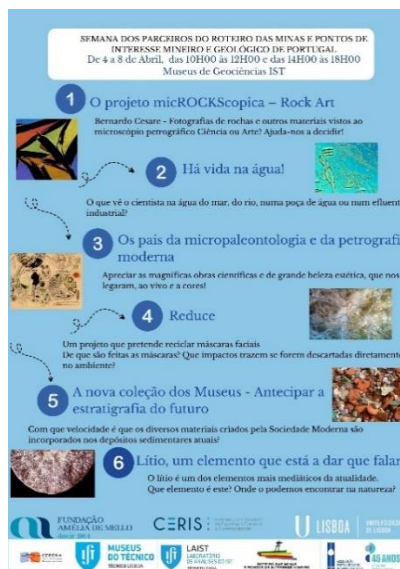


Figure 2. Event poster of the event "Portugal's roadmap with geological and mining points of interest".

Indicators:

- "J. Veloso, P. Bellei, I. Flores-Colen, M. F. Pereira; M. P. Mendes. "Incorporação de Resíduos de Máscaras Cirúrgicas do Tipo IIR em Argamassas de Gesso, Cal Hidráulica e Cimento". < Incorporation of Type IIR Surgical Mask Residues in Plaster, Hydraulic Lime and Cement Mortars> julho de 2022. Relatório CERIS DTC nº 17/2022. ISSN: 0871-7869.
- B. Ramalho; R. Galhano; I. Flores-Colen; M. F. Pereira; M. P. Mendes. "Incorporação de Resíduos de Máscaras Cirúrgicas do Tipo IIR em Espumas de Poliuretano". < Incorporation of Type IIR Surgical Mask Residues in Polyurethane Foams>. julho de 2022. Relatório CERIS DTC nº 16/2022. ISSN: 0871-7869.
- Chen, J.; Pereira, MF; Flores-Colen, I; Borsoi, G.; Oliveira Cruz, C.; Mendes, MP. "LET'S START TO DEAL WITH DISPOSABLE FACE MASK WASTE: The ReDuCe PROJECT". TEST&E 2022 - 3<sup>rd</sup> Conference on Testing and Experimentation in Civil Engineering, Smart Technologies, FCT NOVA, Campus of Caparica: Alameda, Portugal, June 21-23, 2022.



### Project Reference

1801P.01109

### Leading Institution

IST-ID – Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal)

### Partners

CERENA – Centro de Recursos Naturais e Ambiente (Portugal)

### CERIS Principal Investigator

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### CERIS Research Team

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### Funding

BCSD Portugal, Fundação Amélia de Mello

### Period

2021-2023

### Total

24 999.70€

### CERIS

24 999.70€

### Project Website

[percoat.tecnico.ulisboa.pt/Docs/reduce.pdf](https://percoat.tecnico.ulisboa.pt/Docs/reduce.pdf)