

WGB_Shield - Shielding Buildings' Facades on Cities Revitalization. Triple resistance for water, graffiti and biocolonization of external thermal insulation systems (PTDC/ECI-EGC/30681/2017, 2018-2022)



Partners: CERIS/IST and LNEC (National Laboratory of Civil Engineering)

Principal Investigator: **I. Flores-Colen** (40%)

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Other Research Team members: C. Viegas (iBB/IST), A. Dionísio (CERENA/IST), R. Veiga (Co-PI, LNEC), L. Nunes (LNEC), A.R. Garcia (iBB/IST), A. Vilhena (LNEC): S. Malanho (LNEC),

Funding: FCT

Total budget: 221.351€ CERIS: 155.126€

Period: 04/10/2018-03/07/2022

<http://www.lnec.pt/pt/estudos/detalhes.php?tipo=0&id=327>

Summary description: the project aims at the development of ETICS with improved durability in the urban environment, defining performance, durability and ecotoxicity criteria for commercially available solutions. Initially, several different commercially available ETICS systems supplied by three different manufacturers were considered and their water resistance, biological susceptibility and surface properties were evaluated. The durability of these specimens was evaluated and validated through a fine-tuned aging protocol, which consists of hygrothermal, UV and pollutants (SO₂) cycles. The long-term performance in external exposure was also evaluated through natural aging tests. Furthermore, the performance and graffiti-resistance of the several ETICS were analyzed, prior and after the application and removal of graffiti. The bio-susceptibility of ETICS specimens was also evaluated through laboratorial testing, prior and after aging tests. Finally, different case studies (residential buildings in Lisbon) were considered, and mould populations were collected for the identification of microorganisms inhabiting ETICS also using a DNA-based method.

CERIS participation: all research team has extensive experience in the development and technical compliance of coatings and insulation systems, and integrates a multidisciplinary knowledge in the fields of civil engineering, chemistry, nanotechnology and biotechnology. The project has also received support from several ETICS manufacturers. At CERIS, a special focus will be given to the development of anti-graffiti treatments, due to the widespread diffusion of this phenomenon in urban areas. IST and LNEC are working together in all tasks of the project, with the help of PhD researcher G. Borsoi, which won a CERIS seed project in 2021 (7.500€) – Bi-THERM – aims to design and development a bio-hygrothermal model for ETICS, based on field experimental sensor monitoring. <https://ceris.pt/2020/07/07/bi-them/>.

Output: the project intends to deliver: i) integrated analysis of the performance, durability, maintenance and ecotoxicity of ETICS surfaces, taking into account the combined action; ii) fine-tuning of a new set of performance and ageing tests, simulating real urban conditions; iii) the study of protective-repair solutions (with antigraffiti, water-repellant and biocidal properties); iv) a LNEC specification.

Illustrations:



On the left: ETICS solutions; at the centre: Uv-IR irradiation aging tests; on the right: freeze-thaw cycles artificial aging tests

Indicators: one book chapter; 8 articles published; 2 national papers; 5 papers in international conferences; 5 papers in national conferences; one ongoing PhD Thesis - João Parracha with FCT scholarship; 6 MSc dissertations; 6 research reports; one technical report; in 2020 organization of a session at DBMC conference; in 2021, one training course at FUNDEC for professionals about graffiti; and one seed project.

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2. Borsoi, G.; Parracha, J.; **Flores-Colen, I.**; Veiga, R.; Nunes, L.; Viegas, C.; Dionísio, A.; Gomes, M. G.; Faria, P.: “Natural and artificial aging in ETICS: testing protocol” (in Portuguese). CERIS DTC 32/**2019** report, Task 2, October 2019, IST.
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