

# Advanced biological technologies for the purification of indoor air in order to optimize the energy efficiency of buildings

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*Identificativo proposta:* TOES20191202002 **RICHIEDI MAGGIORI INFORMAZIONI**

Spain research institute, developing indoor air treatment technologies to reduce the need for ventilation in buildings, wants to develop a novel, cost-effective and environmentally friendly bioprocesses for the in-situ abatement of indoor air gas pollutants. Partnership requested are companies, universities and research institutes interested in developing new indoor air purification technologies, in order to achieve a technical or research cooperation agreement.

The research group has conducted an intensive research and technology transfer in the development of cost-effective technologies for the treatment of industrial and domestic wastewaters, solid waste and gas emissions since 1980. In the past twenty years, a new research line in biological odour-VOC (volatile organic compounds) - GHG (greenhouse gases) treatment has been initiated. A poor indoor air quality reduces the productivity of employees in working places by 10-15 % and causes multi-million euro losses. According to the Directive 2010/31/EU, European Member States have committed to build nearly zero energy buildings by the end of 2020, while enhancing energy performance during major renovations of existing buildings or retrofitting of building elements. New designs devoted to effective energy savings involve airtight, well-insulated and sealed constructions, which substantially reduces ventilation. This increase in building air tightness will cause a severe impact on the levels of gas and particulate indoor air pollutants, increasing their concentration as a result of the reduced ventilation rates. In this context of potential conflict between energy efficiency measures and enforcement of indoor air quality (IAQ) standards, the development and optimization of versatile technologies for in-situ indoor air purification is increasingly needed. The preliminary results obtained by the research group in the field of biological odour abatement in wastewater treatment plants confirm the technical feasibility of biotechnologies for the control of indoor air pollution. Biotechnologies, which are based on the biocatalytic action of specialised microorganisms, can potentially abate two of the three priority groups of indoor air pollutants according to WHO/EUROPE. Hence, the development of effective and energy-efficient biotechnologies for the in-situ abatement of indoor air pollutants will be central in the context of the recently approved energy performance of buildings directive 2018/844/EU, where health and wellbeing of building users will be promoted through an increased consideration of air quality. The development of a new generation of safe and cost-competitive biotechnologies for indoor air treatment is also aligned with the objectives of the European standard EN 16798-3:2017, focused on achieving a comfortable and healthy indoor environment with acceptable installation and running costs. Indeed, an effective indoor air treatment in-situ will significantly reduce the need for external ventilation and heating. Conventional off-gas treatment bioreactors such as biofilters, biotrickling filters or bioscrubbers exhibit a poor performance during the abatement of hydrophobic volatile organic compounds (VOCs) and volatile inorganic compounds (VICs), which account for a significant share of the total indoor air pollutants. In this context, the development of a new generation of compact, high-mass transfer bioreactors with biomass confinement and an eye-catching design will help exploiting the multiple advantages of biotechnologies for indoor air treatment. The group offers their background and experience in innovative high-mass transfer bioreactors and the complementary biological

solutions. They search partners for developing a technology for the purification of indoor air taking into account the energy efficiency of buildings. The main results of the technology will be protected through patents. The partner sought could be a university, research center or a company interested in: - a technical cooperation agreement interested in developing new indoor air purification technologies - a research cooperation agreement to participate in international cooperation research programs (H2020, Eurostars, Eureka, COSME, LIFE, etc.) in the field of highly energy efficient and decarbonized buildings.

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