

Development of a new technology for biological soil remediation

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Soil is a non-renewable resource and therefore its preservation is essential for a sustainable future. Contaminated soil in fact poses a threat to both ecosystems and human health and cannot be exploited unless it is properly remediated. The remediation of contaminated soils can be carried out through traditional physico-chemical strategies or through more environmentally and economically sustainable biological treatments.

The e-Cube project proposes the design and implementation of industrial-scale bioelectrochemical systems for the biological remediation of hydrocarbon-contaminated soils. The e-Cube system will be developed as a modular bioreactor integrated with electrodes. The e-Cube system is based on the properties of certain microorganisms to degrade pollutants and utilise the electrodes as electron acceptors, while also generating an electric current. The e-Cube system will increase the efficiency of classic biological treatments, improving treatment performance in terms of reducing treatment time, volumes to be treated and operating costs. Moreover, thanks to the modular design of the bioreactors, it will be possible to apply this new technology on-site, limiting the handling and transport of polluted soil.

Specifically, this project allowed the development of the design idea on a laboratory scale for the identification of some system variables, on a pilot scale in a soil treatment plant.