OxFloc

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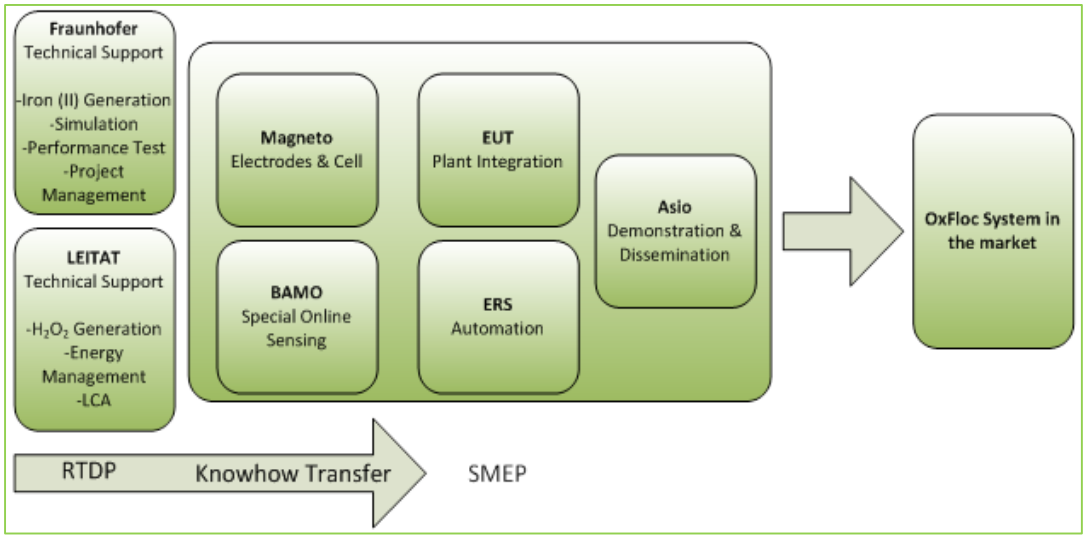
www.oxfloc.eu

Summary description of the project context and the main objectives

Current costs for industrial wastewater treatment in Europe are already an economic burden and are expected to rise. The costs are restricting the growth of the European production sector, especially in water scarce areas where there is a pressing need to reuse water. OxFloc aims to reduce treatment costs while offering modular installation and application engineering at a price below comparable State-of-the-Art processes. OxFloc systems have a quantifiable superior environmental benefit, a smaller plant footprint, lower operation costs, and enable water recycling. Not all industrial wastewaters are the same, but many carry a mix of chemicals and non-biodegradable components e.g. tensides, flame resistants, pharmaceuticals, pesticides and heavy metals. Therefore, industrial effluents need significant treatment before they can be discharged to a municipal wastewater treatment plant. Typically the pollutants exist with suspended particles, requiring a clearing pretreatment which increases cost and energy consumption of current treatments. Our system solves this problem by combining particle removal and adsorption with advanced oxidation. Our OxFloc system is a combined flocculation-oxidation process that needs few chemicals because of the electrolytic production of iron ions as catalyst and flocculant, as well as of hydrogen peroxide, takes place in the reactor itself. It is an integrated system capable of degrading and removing both dissolved and suspended harmful substances from industrial wastewaters using only electrical energy. It is fully compatible with power from renewable energy sources, conventional supply or from smartpower grids balancing supply and demand of electrical energy.

OxFloc involved the generation of new knowledge, the transfer to and assimilation of this knowledge by our SME partnership and then, the post-project exploitation of this new knowledge by the SME partners, who own it collectively. The SME partnership constitutes a supply chain for the production and sales of the OxFloc technology.



Work performed

Since the beginning of the project the project partners have built a team of specialists tackling the individual tasks. The oxidative process and adsorptive process were characterized.

Oxidative process characterization

Starting from literature values the oxidative process was parameterized and experiments were performed on different organic pollutants selected as model pollutants (e.g. phenol and diclofenac). Further landfill leachate was selected as both synthetic and real wastewater. Conductivity, pH and current density were varied amongst other parameters. Optimal operational conditions for the oxidative process were determined by means of the experiments performed.

Adsorptive process characterization

The adsorptive process was characterized by building on review of current literature. Influencing parameters were identified and the range to be investigated determined. Experiments with synthetic and real landfill leachate were performed. Experiments allowed the selection of optimal operational conditions.

Finally both processes were coupled. The results allowed the development of our design concept for the OxFloc 50 l/h prototype which treated synthetic and real landfill leachate by combined electrocoagulation and electro-fenton with most promising results.

Electro generation of hydrogen peroxide

Further a cell for electro-oxidation (anodic oxidation) and hydrogen peroxide production was developed as part of the Oxfloc project to render the Oxfloc prototype independent of external hydrogen peroxide dosing and further reduce the organic load of the effluent.

The complete system was automated, installed and tested at a landfill site near Petrůvky in the Czech Republic.

Market study and environmental benchmarking (LCA) has been performed demonstrating the positive impact of the new technology combinations. The Oxfloc consortium has therefore concluded an exploitation agreement to continue the demonstration and market the Oxfloc technology after the official project end in Dec 2015.

Oxfloc prototype (50 l/h) installed at landfill site:

Description of the expected final results and their potential impacts and use

The development in Oxfloc lead the consortium to a system ready for extended year-round demonstration. After the project the partners intend to produce and market the system creating long term employment in production, sales and service.
Through the adoption of the OxFloc apparatus there could be a significant societal benefit through the reduction of pollution from different kinds of industrial wastewater by improved treatment. The consortium decided to test the technology firstly with landfill leachate. Some toxic organic compounds in landfill leachate are inhibitory to the biological processes at water treatment plants. Raw leachate also contains recalcitrant organic substances that are not degraded during biological treatment at water treatment works. But also other industries as food production, pharmaceutical and petrochemical industry can benefit financially and environmentally from the OxFloc technology.

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