Technology	Nano-biocatalysts as tertiary treatment for the removal or organic micro pollutants from municipal waste water
Research organization	**FHNW** The School of Life Sciences (HLS) of the University of Applied Sciences Northwestern Switzerland (FHNW) is located in the centre of the trinational Basel area (Switzerland – France – Germany). The 4 institutes of the HLS are Pharma Technology, Medical and Analytical Technologies, Chemistry and Bioanalytics (ICB) and Ecopreneurship (IEC).
Description of the technology being developed	The technology consists of the immobilization of oxidative enzymes, i.e. laccases onto nanomaterials (fumed silica) for the degradation of organic micro pollutants as a polishing step after secondary treatment. The produced nano-biocatalysts are applied to the membrane bioreactor, which is operated in continuous mode. Presently the nano-biocatalyst were produced from 3 types of laccase enzymes (T. versicolor 159 and C. unicolour 303 isolated from Georgian forests and a commercial one purchased from Sigma). The produced nano-biocatalysts were tested for the removal of the nootropics ritalinic acid, piracetam and the fungicides thiobendazole and imazalil in presence of various redox mediators TEMPO, ABTS, HBT and syringaldehyde. None of them were capable of removing the fungicides thiobendazole and imazalil in presence or absence of redox mediators. Ritalinic acid was transformed only when the redox mediator TEMPO was added. Nano-biocatalyst produced from T. versicolor 159 laccase was the most effective. This enzyme degraded selected pollutant completely in 48 hours and no differences between free and immobilized enzyme were observed.
Benefits	Removal of organic micro pollutants from waste water
Financial viability	Financial viability will depend on the capacity of the nano-biocatalysts to degrade a large spectrum of target pollutants and on the efficiency of the technology in removing trace amounts of pollutants under varying conditions of pH, temperature, etc.
Potential users	Waste water treatment industries
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