Impacts of nano-erbium and nano-dysprosium to the ligninolytic enzyme production of fungus *Cerrena unicolor* and degradation of azo textile dye

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Nanoscience and technology have produced various new materials, which can be finally released to the environment. Dysprosium (Dy) and erbium (Er) are rare earth elements. Nano-Dy has been used e.g. in laser technology and nano-Er e.g. in semiconductors. Azo-dye Remazol Brilliant Violet 5R has been used in textiles, which can contain also nano-materials to improve properties. The aim was to test impacts of nano-Dy, nano-Er, Dy and Er (10-200 mg/ l) as well as Dy and Er salts (50 mg/ l) to the production ligninolytic enzymes and biodegradation of azo violet dye by the white-rot fungus *Cerrena unicolor* in liquid cultivation. Non-specific extracellular oxidative enzymes, laccase, manganese peroxidase (MnP) and versatile peroxidase (VP) are needed to biodegrade manmade xenobiotic compounds and lignin containing plant detritus.

Our results showed that laccase activity were three times higher in the lowest and middle nano-dysprosium concentration compared to the highest at the day of 26 indicating that nano-Dy (200 mg/ l) was harmful to the laccase production. Laccase activity was clearly higher in the middle nano- and Er concentration than those in the lowest and highest concentration. MnP and VP activities remained throughout cultivation low, and were similar between nano-Dy, Dy and Dy salt as well as between nano-Er, Er and Er salt indicating that they were not toxic. *C. unicolor* biodegraded Violet dye almost completely during 15 days in the presence of all tested metals. Laccase was sensitive to nano-Dy and nano-Er indicating vulnerability of fungi to recycle plant detritus and biodegrade xenobiotics in the nanometal contaminated environment.

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