Biomineralization of selenium nanoparticles by the fungus *Phanerochaete chrysosporium*

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Background & purpose

Selenium (Se) is a metalloid that at trace concentrations is necessary for animal and human life (~40 µg Se d^{-1}), but at high concentrations becomes toxic (~400 µg Se d^{-1}) [1]. Se in the environment is commonly associated with mining, agricultural and some industrial activities. Se is often released as oxyanions, selenate and selenite, bioaccumulates and represents a risk to the environment. We have investigated the use of the white-rot fungus, *Phanerochaete chrysosporium*, as a potential agent for remediation of Se-polluted waters [2,3,4].

Results

P. chrysosporium is able to transform selenite (up to 20 mg L^{-1}) into elemental Se nanoparticles when grown in the form of pellets or biofilms (Fig. 1) under semi-acidic conditions. These Se nanoparticles are a stable and less toxic form of Se with added value for industrial applications. This presentation will provide a synthesis of our findings including descriptions of the effects of selenite on fungal growth, activity and biofilm development, characterization of the produced nanoparticles, and potential use of *P. chrysosporium* for treating Se-polluted acidic effluents (e.g. acid mine drainage and acid seeps) [2,3,4]. Unpublished and future work focusing based on creating fungal-bacterial co-cultures to enhance Se removal efficiencies will also be discussed.

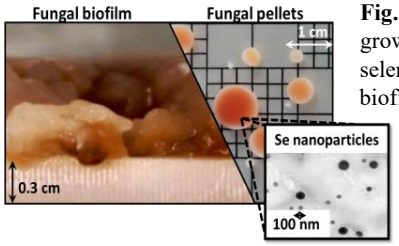

Fig. 1 *P. chrysosporium* grown in presence of selenite (pellets or biofilms) produces elemental Se nanoparticles.

[1] Lenz & Lens (2009) Sci Total Environ 407(12):3620-3633. [2] Espinosa-Ortiz et al. (2015) Appl Microbiol Biotechnol 99(5):2405-2418. [3] Espinosa-Ortiz et al. (2016) Bioresource Tenol 210:138-145. [4] Espinosa-Ortiz et al. (2017) Int Biodeter Biodegr 124: 258-266.