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Assessment of microalga biofilms for simultaneous remediation and biofuel generation in mine tailings water

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ABSTRACT

Microalgae crops can generate a biochemical profile of high energy density and may be used for remediation of contaminated waste waters. This manuscript presents a laboratory-scale investigation into the potential for growing endemic microalgae biofilms in phosphorus-enriched nickel refinery tailings water, with an emphasis on product potential and the remediation of heavy metals. The dominant species of the consortia was a *Chlorella*-like microalga. The growth was monitored over time, with a productivity (0.77 ± 0.07 g AFDW.m⁻².day⁻¹) showing promising potential. The biochemical profile of biomass had a high total carbohydrate yield (40.0%), and a potential for increased lipid yields (6.7% - 19.5%). Biofilms showed a significant potential for the removal of heavy metals (Ni, Co, Mn, Sr) from the waste water with 24.8%, 10.5%, 24.8% and 26.4% reduction in Ni, Co, Mn and Sr, respectively. Results highlight significant potential for large-scale biofilm biomass production using metal-laden nickel refinery waste waters.

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