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Microbial Strains for High-Tech Critical Metals Recovery

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Extended Abstract

High-tech critical metals were defined as those metals essential for high-tech industry but with low availability due to uneven geographical distribution, thus resulting a high price volatility [1 - 3]. The challenge of the future is to assure a stable supply of high-tech metals by innovative approaches such as biomining. Potential alternative sources and possible new biotechnologies are the subject of current research [4, 5]. The main ***objective*** of our work was to isolate microbial strains with potential on biosolubilization and bioaccumulation of high-tech critical metals.

Experimental: The samples of mining tailings containing high tech critical metals were collected from a depth of approximately maximum 100 cm below surface. They were placed in clean sterile bags, labelled accordingly and stored at 4 ^{o}C until further analysis. In order to be used for the microbiological studies, the samples were grounded to obtain a coarse powder. The chemicals used was metal(loid)s (Mo, W) and cultivation media for isolation and maintenance of the strains isolated (nutrient agar, nutrient broth, DSMZ 670 modified). Two different strategies were employed for the isolation of bacteria from the mine wastes samples. Following the isolation and purification, the strains were evaluated for the ability to grow on minimal agar in the presence of various concentration of Mo and W. The isolated strains were tested for their metal tolerance using the agar diffusion method. The agar was supplemented with successively higher concentrations (0, 5, 25, 50 mg /L) of the critical metals mentioned before. The growth of bacteria on the plates containing culture media with no metals was considered as control.

Results: Bacterial strains capable of biosolubilizing and bioaccumulating Mo and W were isolated by applying two different strategies. The strains were isolated from the plates incubated at ambient temperature (23 - 24 ° C). The bacterial colonies were studied with respect to size, colour, opacity, and form. All bacterial strains proved to be Gram-negative.

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