Nickel, Copper and Chromium Removal from Contaminated Wastewaters by *Serratia plymuthica* and *Rhodococcus quingshengii* strains

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Abstract

Nowadays accumulation of heavy metals in water bodies represents a serious environmental and human health threat [1]. Heavy metals are known for their utility in industrial processes such as industrial welding, dyes and pigments manufacturing, electroplating processes, leather tanning and wood preservation [2]. Among possible remediation strategies, the use of biological systems can be proposed since microorganisms interact with metals by passive adsorption processes and active enzymatic reactions [3].

In the present study, resistance to heavy metals and ability to reduce their concentration in industrial wastewaters were determined for *Serratia plymuthica* strains SC3I(2) and As3-5a(5) and *Rhodococcus quingshengii* strain SC26 . The *S. plymuthica* strains were tested for Ni(II) and Cu(II) biosorption by filtration. SC3I(2) was able to remove 89.4% of Ni(II) from a 50 mg L^{-1} solution, and showed maximum biosorption capacity of 33.5 mg g^{-1}. As3-5a(5) removed up to 91.5% of Cu(II) from a 200 mg L^{-1} solution, yielding maximum biosorption capacity of 80.5 mg g^{-1}. *R. quingshengii* strain SC26 was characterized for its ability to resist to hexavalent chromium (MIC of 300 mg L^{-1}) and to reduce up to 51.14 mg L^{-1} hexavalent to trivalent chromium in growing-cell conditions. Bacterial strains ability to adsorb Ni(II), Cu(II) and Cr(VI) was assessed also in planktonic experiments. Trials on electroplating wastewaters were conducted to assess the bioremediation potential of *S. plymuthica* strains SC3I(2) and As3-5a(5) and *R. qingshengii* strain SC26 in close-to-real scenarios. Their characterization will provide information regarding possible metal removal and recovery in a full-scale bioremediation system.

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