Starbon® Case Study - *selective adsorption of critical metals*

The efficiency of Starbon® materials in metal recovery and separation from Platinum Group Metals (PGM) mine tailings has been demonstrated using a solution of Ni^{2+}, Cu^{2+}, Zn^{2+}, Ir^{2+}, Au^{3+}, Pd^{2+} and Pt^{2} as a model system.

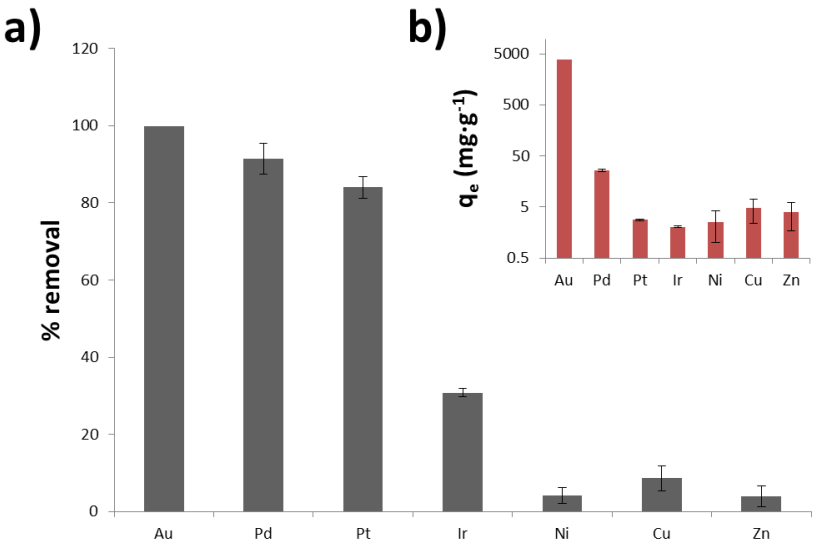

Figure 1. a) Metal removed from solution when 50 mg of adsorbent were added (%) and b) adsorption capacity for each metal (mg/g).

Starbon® removed the majority of the Au3+, Pd2+ and Pt2+ from solution. Conversely, the adsorption of Ni^{2+}, $Cu^{2+}$and Zn^{2+} did not exceed 20% (Figure 1).

A further study was carried out using a solution with a much lower metals concentration, typical of commercial mining streams where precious metals are found in much lower concentrations than other elements.

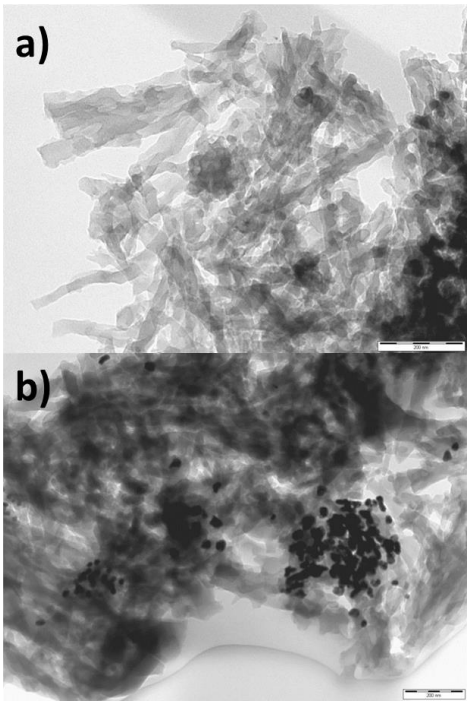

Figure 2. TEM images of Starbon® a) before and b) after adsorption.

The initial concentration of precious metals in the mixture was lowered 100 times with respect to the other metals. Results showed that Starbon® removed >85% of the PGM from solution, leaving the other metals unaltered. Therefore a preferential adsorption of PGM was demonstrated regardless of starting concentration.

TEM images showed the presence of nanoparticles in the CMM after adsorption (Figure 2). The formation of nanoparticles during the adsorption supports the proposed reduction mechanism for adsorption.