Innovative Bio-Based Adsorbents for Platinum Group Metals Recovery

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Rising demand for platinum group metals (PGMs) is intensifying due to the depletion of natural resources and the need for sustainable solutions in the circular economy. Utilization of advanced methods like adsorption with innovative bio-based materials is crucial for the recycling of PGMs from wastes[1]. Bio-based materials can adsorb metals through mechanisms including ion exchange, complex formation, electrostatic interaction, chelation, redox reactions, and precipitation[2, 3]. In this work, lyophilized egg white is investigated as adsorbent for the adsorption of PGMs from dilute model multimetallic solution and an HCl-based leaching solution derived from spent catalytic converters. Results showed that lyophilized egg white has excellent performance in selectively separating and recovering PGMs, with minimal co-adsorption of other metals. Tests with pure albumin exhibited similar PGM adsorption rates to lyophilized egg white, highlighting the important role of these proteins in the adsorption process of the tested bio-materials. Various factors, including adsorption isotherms and kinetics, adsorption capacity, pH, temperature, and contact time, were thoroughly examined in this study.

Acknowledgements

This work was further supported by national funds through FCT/MCTES (PIDDAC): LSRE-LCM, UIDB/50020/2020 (DOI: 10.54499/UIDB/50020/2020) and UIDP/50020/2020 (DOI: 10.54499/UIDP/50020/2020); ALiCE, LA/P/0045/2020 (DOI: 10.54499/LA/P/0045/2020); CICECO-Aveiro Institute of Materials, UIDB/50011/2020, UIDP/50011/2020 & LA/P/0006/2020. This work was also financially supported by national funds through FCT – Fundação para a Ciência e a Tecnologia, I.P., within the scope of the project PlatILPlus (2022.04478.PTDC, DOI: 10.54499/2022.04478.PTDC). Filipe H. B. Sosa acknowledges FCT – Fundação para a Ciência e a Tecnologia, I.P. for the researcher contract CEECIND/07209/2022 (DOI : 10.54499/2022.07209.CEECIND/CP1720/CT0019). F. Braga acknowledge FCT for the PhD grant 2023.01749.BD.

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