DIPARTIMENTO DI CHIMICA

SAPIENZA
UNIVERSITÀ DI ROMA

Seminario di Dipartimento
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Spectroelectrochemistry of Copper Sulfide Minerals: Chalcopyrite and Enargite

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Abstract
Part I, Chalcopyrite: Cyclic voltammetry experiments have been conducted on copper and chalcopyrite ($CuFeS_2$) in the absence and presence of ethyl xanthate and compared to mass-balanced E_H–pH diagrams. Results for copper duplicate what is found in the literature and confirm xanthate chemisorption. However, for chalcopyrite, results indicate that it oxidizes to chalcocite (Cu_2S) and only afterwards is chemisorption observed due to small currents appearing with xanthate. This phenomenon suggests that the mineral's hydrophobicity is induced by more than dixanthogen and copper xanthate and was found to be pH-dependent under a range of alkaline conditions (i.e., pH 7–11) at narrow potentials (i.e., 0 to –200 mV). An E_H–pH diagram for chalcopyrite with xanthate is presented to illustrate the conditions under which it would be hydrophobic and thereby more thoroughly explain the results seen in the literature.
Part II, Enargite: Following a brief review Cu-As-S systems and processing methods, E_H-pH diagrams in the literature are compared to those determined in this study by mass-balancing. Raman spectroscopy studies, coupled with voltammetry experiments, were used to verify the diagrams. The diagrams were then used to predict how either the Cu or As could be separated by selective leaching processes and possibly collectorless flotation (i.e., in the absence of xanthate).

Prof Courtney A. Young is currently Department Head and Lewis S. Prater Professor at Metallurgical & Materials Engineering School of Mines and Engineering Montana Tech of the University of Montana. His topical areas of expertise cover Process Engineering, Mineral Separations, Hydrometallurgy, Remediation, Waste Treatment and Minimization, Surface Chemistry, Electrochemistry, Spectroscopy, Precious Metals Processing, Cyanide Destruction and Recycling, Sulfide Electrochemistry, Flotation, Separation Processes, Spent Pot Liner Remediation, Adsorption, Coal Processing, Uranium Extraction, General Recycling.

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