



MSE SEMINAR

**Materials Science and Engineering
Michigan Technological University**

Monday, January 28, 2013

1:00 pm – 2:00 pm

Room 610, M&M Building



Impregnated Activated Carbon for Gold Extraction from Thiosulfate Solutions

John & Virginia Towers Distinguished Lecture Series

Prof. Courtney A. Young

Metallurgical & Materials Engineering
Montana Tech, Butte, MT

Abstract

Hydrometallurgical processing of gold is almost exclusively accomplished with cyanidation. However, the technology has been attacked due to cyanide toxicity leading to an increase in studies about cyanide alternatives, particularly thiosulfate. Thiosulfate leaching of gold is similar to cyanidation; however, gold recovery from thiosulfate solutions is not possible with conventional carbon adsorption necessitating the use of more expensive resin adsorption/ion exchange processes. In order to cheapen the gold recovery process from thiosulfate solutions and make it cost-competitive against cyanidation, a novel gold thiosulfate solution recovery process is described and characterized in which activated carbon is impregnated with cyano-cuprous species allowing for high gold extraction followed by traditional elution. Results indicate that, at low cyano-cuprous adsorption densities, gold extraction occurs via a metal-exchange reaction yielding adsorbed cyano-aurous species; however, at high adsorption densities, gold extraction appears to occur as a polymerization reaction yielding adsorbed cyano-cuprous/aurous complexes. Elution efficiency of both species depends on the resulting gold state. Optimal conditions for extracting and eluting gold were identified from computational models developed from statistically designed experiments. The technology shows great promise but needs to be tested on a larger and continuous scale.

Biography: Dr. Courtney Young is Department Head and Lewis S. Prater Distinguished Professor of Metallurgical & Materials Engineering at Montana Tech of The University of Montana. Dr. Young has expertise in surface chemistry, electrochemistry and spectroscopy. His specialties in mineral processing/extractive metallurgical engineering include mineral characterization, flotation, physical separations, leaching, cyanide, uranium, gold processing, adsorption and applications thereof to recycling and waste-water remediation. Dr. Young has been and continues to be extremely active in several professional organizations, particularly SME and TMS, as an officer, author and presenter as well as an organizer of sessions and symposia. He has been accordingly recognized for his efforts including plenary lectures, the Young Engineer Award from the Mineral and Metallurgical Processing Division of SME, Frank F. Aplan Award from AIME, and President's Citation from SME. Finally, he has applied for a patent on his research for developing a novel carbon adsorption process for extraction gold from thiosulfate solutions. The non-cyanide technology has potential to make thiosulfate leaching cost-effective and therefore competitive to cyanide leaching.

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