

Enhanced Separation of Rare Earth Elements (REEs) using Novel Ionic Liquids

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**Chemistry
Seminar on
Rare-earth
separation**

**4:00 p.m.
Monday
April 18 in G3
Schrenk Hall
and via Zoom**

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Abstract: Owing to their crucial importance, increasing demands, and monopolistic supply, the development of novel technologies for the recovery of critical metals is of considerable significance. Ionic liquids are currently applied as alternatives to conventional solvents and extractants that are used in the solvent extraction process, which plays a major role in the hydrometallurgical separation of critical metals, due to their higher selectivity and physiochemical flexibility. This research developed a new type of ammonium-based functionalized ionic liquids (FILs) for improved extraction and separation of rare earth elements (REEs). Both anions and cations of synthesized FILs are composed of only C, H, O, and N atoms, which are incinerable and therefore would help to reduce the amounts of solid wastes produced by the extraction process. The developed FILs shows high extraction efficiency, improved loading capacity, fast kinetics, and enhanced selectivity towards heavy REEs. Moreover, back-extraction studies revealed that the synthesized FILs can be recycled and effectively reused in the extraction process.

About the speaker: Dr. Lana Alagha is currently an Associate Professor in the Department of Mining & Explosives Engineering at Missouri S&T. Dr. Alagha joined the mining engineering program at S&T in Fall 2012 as the first full-time female faculty in the department since its inception in 1870. She holds a Ph.D. degree in Materials Chemistry and Nanotechnology from the University of Texas at Dallas, and a B.Sc. degree in Chemistry from the University of Bethlehem, Palestine. Dr. Alagha has held diverse teaching and research appointments in the US and Canada.

Dr. Alagha has 10⁺ years of experience in conducting mineral processing-related research projects at both fundamental and applied levels. Her current research interests include critical minerals, rare earth extraction, flotation of sulfide and nonsulfide minerals, clean coal technology, reprocessing of tailings wastes produced from mining operations, and artificial intelligence application in flotation processes. She received research funds from multiple sources including NSERC, NSF, NIOSH, First Solar, Monsanto, and Saudi Mining Polytechnic. Dr. Alagha is currently a senior investigator in the O'Keefe Institute for Sustainable Supply of Strategic Minerals; Rock Characterization, and Geomechanics Research Center (EMRGe), and Material Research Center (MRC) at Missouri S&T. She is also a member of the Society of Mining, Metallurgy and Exploration (SME) and the American Chemical Society (ACS).