JONATHAN (JON) YANG, PH.D.

Education

Ph.D., Ocean, Earth, and Atmospheric Science, Oregon State University, 2017

B.S., Chemical Engineering, University of Arizona, 2012

Professional Experience

Dr. Yang is a geochemist/engineer with 7 years of experience in identifying and developing solutions to geochemical questions utilizing skillsets in experimental design, analytical chemistry, geochemical modelling, geological characterization, and engineering process design. He is also experienced in advancing research from early technology readiness levels along pathways for potential commercialization and/or technological transfer.

Critical Mineral Extraction Processes Development

Albany, Oregon. NETL. Lead critical metal (e.g., REEs, V, Ni, Co, Cu, PGE) resource assessments in unconventional feedstocks (e.g., non-mineable coal, metalliferous black shale, ultramafic rocks) using analytical chemistry, electron microscopy, and geologic characterization techniques.

Lead the design of novel critical metal extraction processes from unconventional feedstocks using experimental design, geochemical modelling, analytical chemistry, and engineering process design including process flowsheet modelling. Work has led to one patent award and technology commercialization funding grant to date. Actively drove strategic and programmatic directions for research focus areas, including pursuing competitive external funding opportunities and industry/stakeholder commitments.

Postdoctoral Research Fellow, ORISE Postgraduate Research Program

Albany, Oregon. NETL. Developed novel extraction processes to recover rare earth elements from coal-related waste streams using environmentally benign processes and chemical applications. Developed U.S. patent award for citrate leaching technology of coal seam underclays (US20220074019A1).

Hydrometallurgical Extractions

Tucson, Arizona, HydroGeoSense, Inc. Developed and standardized operating procedures for metals analysis via flame AA and ICP-OES and wet chemistry methods to optimize hydrometallurgical extraction of precious metals (Cu, Au, Co, Ni).

Publications and Presentations

Prem, P.; Burgess, W.; Yang, J.; Verba, C. Extraction Kinetics of Rare Earth Elements from Ion-Adsorbed Underclays. Minerals 2023, 13, 1503. https://doi.org/10.3390/min13121503.

Bauer, S.; Yang, J.; Stuckman, M.; Verba, C. Rare Earth Element (REE) and Critical Mineral Fractions of Central Appalachian Coal-Related Strata Determined by 7-Step Sequential Extraction. Minerals 2022, 12, 1350. https://doi.org/10.3390/min12111350.

Yang, J., Montross, S.N., Verba, C.A. Assessing the Extractability of Rare Earth Elements from Coal Preparation Fines Refuse using an Anionic Organic Acid Lixiviant. Mining, Metallurgy and Exploration 2021, 38, 1701-1709. https://doi.org/10.1007/s42461-021-00439-2.

Montross, S. N., Yang, J., Britton, J., McKoy, M., & Verba, C. Leaching of Rare Earth Elements from Central Appalachian Coal Seam Underclays. *Minerals* 2020, *10*(6), 577. https://doi.org/10.3390/MIN10060577.

Yang, J., Montross, S., Britton, J., Stuckman, M., Lopano, C., & Verba, C. Microanalytical Approaches to Characterizing REE in Appalachian Basin Underclays. *Minerals* 2020, *10*(6), 546. https://doi.org/10.3390/min10060546.

Yang, J., Verba, C., Torres, M., & Hakala, J. A. Empirically assessing the potential release of rare earth elements from black shale under simulated hydraulic fracturing conditions. *Journal of Natural Gas Science and Engineering* 2018, *50*, 259–268. https://doi.org/10.1016/J.JNGSE.2017.09.011.

Yang, J., Torres, M., McManus, J., Algeo, T. J., Hakala, J. A., & Verba, C. Controls on rare earth element distributions in ancient organic-rich sedimentary sequences: Role of post-depositional diagenesis of phosphorus phases. *Chemical Geology*, 2017, *466*, 533–544. https://doi.org/10.1016/J.CHEMGEO.2017.07.003.

Yang, J., & Haley, B. The profile of the rare earth elements in the Canada Basin, Arctic Ocean. *Geochemistry, Geophysics, Geosystems* 2016, *17*(8), 3241–3253. https://doi.org/10.1002/2016GC006412.