Professor Yousef Ghorbani is a highly accomplished academic and industry professional with over 18 years of experience in the field. He earned his MSc degree in Mineral Processing and Extractive Metallurgy from the University of Tehran, Iran, in 2005, and a PhD degree in Chemical Engineering (bio-hydrometallurgy) from the University of Cape Town, South Africa, in 2012. Additionally, Dr. Ghorbani holds the qualifications of Chartered Scientist (CSci), Chartered Environmentalist (CEnv), and Chartered Engineer (CEng) from the Institute of Materials, Minerals, and Mining (IOM3) - United Kingdom. He was also awarded the Senior Fellowship of the Higher Education Academy (SFHEA) in recognition of his achievements against the UK Professional Standards Framework for teaching and learning support in higher education.

Dr. Ghorbani has more than 16 years of strong science and academic background, industrial experience, and senior management level experiences in the field of (i) ***Hydrometallurgy***, (ii) ***Electrochemical energy storage and electrochemistry***; (iii) ***state-of-the-art and novel techniques for materials characterization and analysis,*** and (iv) ***enhancement of overall process performance and energy/material utilization in processing, and recycling of high-tech and critical raw materials (CRMs) including energy critical elements*** aligned with net-zero emissions and green transition at different universities and industrial R&I centres worldwide such as South Africa, Iran, Chile, Sweden, and the United Kingdom. Currently, Dr. Ghorbani holds the position of Professor in Material Chemistry and Bio-Hydrometallurgy at the School of Chemistry, the University of Lincoln, UK. His research interests, academic teaching, and industrial experience are focused on innovative, green, and systematic processing and supply and advance application high-tech and CRMs for the green energy transition.

Forging a Sustainable Path: Shaping the Future Supply of Energy Materials/Metals for the Green Energy Transition

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Abstract

In the pursuit of a sustainable future driven by green energy, the availability of energy materials and metals emerges as a pivotal factor. This Plenary lecture aims to unravel the intricate strategies necessary to steer through this transition, highlighting the paramount importance of sustainability across multiple dimensions. Central to this endeavour are material chemistry strategies meticulously crafted to optimize resource utilization while maximizing material performance. This entails a deliberate focus on material substitution and design optimization, which not only reduces reliance on scarce resources but also enhances overall resource efficiency. Concurrently, initiatives in recycling and reuse emerge as potent tools in combating resource scarcity and mitigating environmental degradation. The pursuit of sustainable solutions extends into the realm of material exploration and development, where innovation plays a crucial role in unlocking novel materials tailored to the specific needs of green energy technologies. This necessitates a continuous cycle of research and innovation, driving advancements in efficiency, durability, and recyclability. Furthermore, the adoption of sustainable extraction and processing techniques is imperative. These practices not only minimize ecological footprints but also uphold ethical sourcing standards, thereby ensuring the integrity of the entire supply chain. By integrating circular economy principles, we establish closed-loop material flows where waste is minimized, and resources are perpetually regenerated. In essence, this talk encapsulates key considerations and strategies essential for navigating the complexities of energy material supply in the context of the green energy transition. Through a comprehensive synthesis of these approaches, we chart a course towards a sustainable future, where energy material supply chains are not only resilient but also ethical and environmentally responsible.