Contribution ID: **305** Type: **Oral**

Recent Advancements of Metallic Materials for Integral Molten Salt Reactors

The Integral Molten Salt Reactor (IMSR) is a design for a type of advanced nuclear reactor that utilizes molten salt as both the coolant and the fuel solvent, targeted at developing a commercial product for the small modular reactor (SMR) market. This innovative approach to nuclear reactor design offers several advantages over traditional solid-fueled reactors, including enhanced safety features, improved fuel efficiency, and greater operational flexibility. The status of metallic structural materials for IMSR is an area of active research and development, driven by the unique demands that the molten salt environment places on reactor components. One of the primary concerns with metallic materials in IMSRs is their resistance to corrosion by molten salts. Furthermore, materials used in these reactors must maintain their mechanical integrity, resist creep, and avoid embrittlement under these conditions. High-temperature materials such as nickel-based superalloys and advanced stainless steels are under investigation for their suitability in MSR applications. The materials used in MSRs must also withstand the effects of neutron irradiation, including displacement damage and transmutation. Radiation can alter material properties, leading to swelling, hardening, and embrittlement. In this paper, recent advancements of metallic materials for IMSRs including advanced stainless stees, nickel super alloys and high entropy alloys are thoroughly presented and reviewed in terms of corrosion resistance, high-temperature performance and radiation resistance. Further, testing and standardization for code qualification and regulatory and licensing considerations are also examined.

Country OR International Organization

Saudi Arabia

Email address

asalomari@kacst.gov.sa

Confirm that the work is original and has not been published anywhere else

YES

Authors: ALOMARI, Abdullah (King Abdulaziz City for Science and Technology); Mr MILIBARI, Alaa (KACST); Mr ALHAZMI, Mohammed (KACST)

Presenter: Mr MILIBARI, Alaa (KACST)

Track Classification: Topical Group A: SMR Design, Technology and Fuel Cycle: Track 3: Engineering, Codes & Standards, Supply Chain, Operation and Maintenance of SMRs