Contribution ID: **448**   Type: **POSTER**

Sensors of content of oxygen dissolved in heavy liquid metal coolants

Tuesday 27 June 2017 17:30 (1h 30m)

Up-to-date technology of lead-based coolants is now founded mainly on the paramount importance of oxygen addition to the coolant assuring corrosion resistance of structural steels.

In the early stage of HLMC technology development, oxygen content was monitored by coolant sampling and analysis. Later on, more efficient methods of control using electrochemical sensors with solid oxygen-conductive electrolyte were developed and tested.

An extensive work is now under way at the SSC RF –IPPE on solid electrolyte sensors for monitoring oxygen content in lead-based liquid metals. Significant R&D work has been done on the development of solid electrolyte sensor design and production technology. The results of sensor design optimization studies are as follows:

- solid electrolyte ceramic sensor (CS) made of the oxide ceramics, which is capable of operating during the long time in the liquid metals at high temperatures under thermal cycle conditions. It has stable conductivity and strength characteristics, as well as thermal stability and low gas permeability;

- various sensor designs devoted for oxygen control in the lead-based liquid metals in facilities with static coolant, experimental loops and full-scale pool reactor systems.

Among the latest developments there is a sensor consisting of several independent detecting elements with various reference electrodes located in one holder.

Country/Int. Organization

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Session Classification: Poster Session 1

Track Classification: Track 5. Fast Reactor Materials (Fuels and Structures) and Technology