

EXPERIMENTAL INVESTIGATION ON OXYGEN ACTIVITY IN LIQUID LEAD-BISMUTH EUTECTIC

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Abstract

Lead-Bismuth Eutectic (LBE) has been widely studied as core coolant and target material of ADS (accelerator driven transmutation system) in various countries. The development of the oxygen sensor is an important task to control the oxygen concentration in an LBE coolant system. Experimental study has been conducted to investigate the oxygen activities for the liquid LBE. The oxygen partial pressure was controlled with the hydrogen and vapour mixture under the temperature range from 300 ~ 650°C. The oxygen sensors made of solid electrolyte were prepared to measure the electro-motive force (EMF) under the controlled gas conditions. The reference electrodes were prepared with Pt-air or Bi-Bi₂O₃ and a solid electrolyte was made of a ZrO₂ stabilized yttria. The performance of oxygen sensor was investigated in view of applicability to the LBE system and the obtained EMF value was compared with a theoretical value based on Nernst equation.