

Effect of magnetic field on the corrosion behavior of Indian RAFMS in liquid Pb-Li

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In the present study, the effect of magnetic field on the corrosion of Indian Reduced Activation Ferritic Martensitic Steel (IN RAFMS) in flowing lead lithium eutectic (Pb-Li) has been studied in an electromagnetic pump driven loop (EMPPIL-M). The corrosion rate in the presence of 0.5 KG magnetic field at a temperature of 773 K has been found to be 1.3 times higher than that observed in the absence of magnetic field. The surface of the IN RAFMS sample located inside the magnetic field showed non uniform corrosion and formation of distinct surface features which were revealed through optical and secondary electron (SE) micrographs. The Pb-Li attack in the presence of magnetic field was not only confined to the prior austenite and lath boundaries as in the absence of magnetic field; but also happened in the intra-lath regions causing formation of subgrains. The change in Pb-Li flow profile due to magneto-hydrodynamic effect is expected to play a major role in the formation of surface features, non uniformity in surface attack and increased corrosion rates in the presence of magnetic field. The detailed discussion on the results obtained from analysis of the exposed samples through various characterisation techniques (stereomicroscope, optical profilometry, secondary electron microscopy-energy dispersive spectroscopy [SEM-EDS], etc) will be presented in this paper.

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