

A PHYSICAL REASON WHY MOLTEN LEAD-BISMUTH ALLOY HAS ADVANTAGE OF BEING USED AS A POTENTIAL COOLANT FOR FAST NUCLEAR REACTORS DESIGN

Nuclear power plants have provided much electricity energy for the world. The International Atomic Energy Agency reports that there are about 437 nuclear power reactors in operation and 69 nuclear power reactors under construction in 31 countries around the world in the year 2016.

The development and construction of thermal reactors have been a research and development program by several member countries of the International Atomic Energy Agency on fast reactor design, cooled by liquid, metal, gas or others. For the development of nuclear energy concepts to meet consumer needs, it was known that the properties of lead-bismuth alloy coolants in lead cooled fast reactor systems offer many potential advantages for reactor designs and applications.

Molten liquid Pb-Bi coolants offer a number of interesting properties: chemically inert with air and water (unlike sodium coolant), low vapour pressure over the relevant temperature interval range, high boiling temperature (compared with sodium coolant) and others. However, it was also already known for a long time that Pb-Bi coolants at the temperatures of interest can be very corrosive to structural materials.