



Contribution ID: 780

Type: not specified

P2.209 Measurement of thermal conductivity of Li_2TiO_3 pebble bed by laser flash method

Tuesday, 18 September 2018 11:00 (2 hours)

The functional materials of solid-type breeding blanket concepts for fusion reactor are used in a pebble bed form. In order to verify the performance and safety of the breeding blanket, the thermal conductivity of pebble bed is required. The hot wire, hot disk, guarded hot plate and laser flash method are considered as measurement technique for the thermal conductivity of pebble bed. This study aims at the provision of thermal conductivity of Li_2TiO_3 pebble bed for the breeding blanket. The laser flash method has been chosen due to its advantages compared with other methods, such as high accuracy and repeatability, easy sample preparation, and absolute measurement technique. In this method, the thermal diffusivity is directly measured by the laser flash system, and then the effective thermal conductivity is obtained by multiplying density and specific heat to the measured thermal diffusivity.

The Li_2TiO_3 pebbles with high sphericity were prepared by slurry droplet wetting method. The average diameter of pebbles was about 1.1 mm. The sample container was specially designed for the pebble bed measurement, which was made of graphite to withstand high temperature. The quartz disc and ring were adopted as a thermal insulator to avoid heat transfer from pebble bed to graphite container. The volume of pebble bed was about 1.7 mL, which was relevant only 3.0 g of Li_2TiO_3 pebbles. The packing factor of Li_2TiO_3 pebble bed was about 59.3 %. The thermal diffusivity of the pebble bed was measured in flowing helium at elevated temperature to 800 oC with 100 oC of intervals. The effective thermal conductivity of Li_2TiO_3 pebble bed was calculated at about 1.4 W/mK at 500 oC ~ 700 oC. The detailed results and trends of thermal conductivity on Li_2TiO_3 pebble bed will be introduced in the present study.

Presenter: PARK, Yi-Hyun (National Fusion Research Institute)

Session Classification: P2