

## Measurement of neutron total cross sections of Sn-Pb alloys in solid and liquid states

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Recently, a small modular reactor (SMR) with inherent and passive safety has been receiving attention all over the world. In Japan, a very small modular reactor, namely, MoveluX<sup>TM</sup> (Mobile-Very-Small reactor for Local Utility in X-mark) has been developing by Toshiba Energy Systems & Solutions Corporation. MoveluX<sup>TM</sup> is a thermal reactor that uses a calcium hydride as a neutron moderator. The use of a Sn-Pb alloy as an in-core heat transport medium is being considered. The Sn-Pb alloy is in a solid state when the reactor is started, and becomes liquid since the core temperature reaches 660°C during operation. Therefore, the total cross section data of the Sn-Pb alloy is important for evaluating the effect of the change in the total cross section depending on the state of Sn-Pb alloy on the reactor characteristics. However, there are no reports on experimental data for total cross section of Sn-Pb alloys in both solid and liquid states in spite of the fact that it is important data for nuclear engineering. In the present study, the neutron total cross section was obtained from neutron transmission measurements by the time-of-flight (TOF) method using the Kyoto University Institute for Integrated Radiation and Nuclear Science –Linear Accelerator (KURNS-LINAC). The sample temperature was changed from room temperature (solid) up to 300°C (liquid). The total cross sections of solid and liquid states were compared and the change in Bragg edge due to the difference of crystal structure was observed in the energy region below 0.01 eV. Comparing the total cross sections of the solid and the solid resolidified after melting, it was confirmed that some Bragg edges, which are thought to be due to the crystal structure of Pb, disappeared by the resolidification. At the poster presentation, the detail of the total cross section measurement experiment and the results obtained so far will be discussed.

**Primary author:** Mr UEMURA , Takuya (Kyoto University)

**Co-authors:** Prof. HORI, Jun-ichi (Kyoto University); Dr TERADA , Kazushi (Kyoto University); Prof. SANO, Tadafumi (Kindai University); Dr NISHIYAMA, Jun (Tokyo Institute of Technology); Dr KIMURA , Rei (Toshiba Energy Systems & Solutions Corporation / 東芝エネルギーシステムズ); Prof. NAKAJIMA, Ken (Kyoto University)

**Presenter:** Mr UEMURA , Takuya (Kyoto University)

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