Inner observation of canning Cadmium by energy-selective neutron imaging at NOBORU

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We found that Cadmium (Cd) was not only a suitable thermal neutron absorber as a poison material in a pulsed spallation neutron source, but also had a long life time with a small sacrifice in neutron intensities at an intense source[1]. Therefore, we decided to use Cd as the poison material in the first moderator in the Japan Spallation Neutron Source (JSNS).

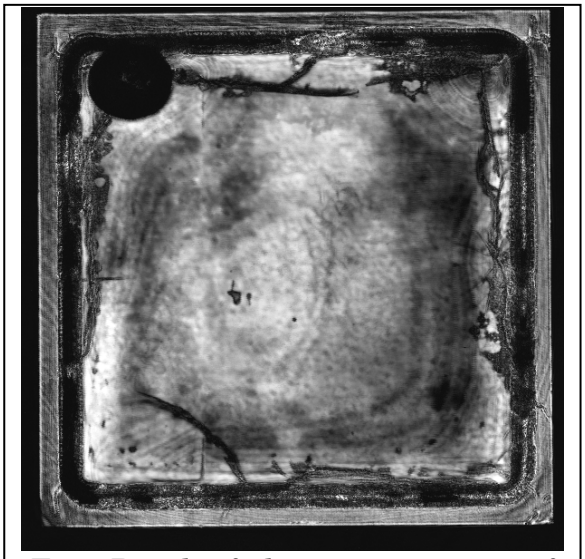

Fig.1 Result of ultra sonic imaging of sample

In the development stage of JSNS, canning of a Cd plate by an aluminum alloy (Al-alloy) with the Cold Isostatic Pressing method (CIP) failed and the Al-alloy cover of the Cd plate was broken. In order to correct the manufacturing process, we have to observe the inside of the sample to find the reason for failure. Figure 1 shows an ultra-sonic image of the failure sample by the transmission method. Some untransmittable regions can be found in the figure.

To investigation the inside of the canning Cd plate non-destructively, we applied the energy selective neutron imaging method. We measured the transmission of the canning Cd plate used by the micro-pixel chamber (μPIC) [2, 3] neutron detector at NOBORU (BL10) in JSNS. As a result, several vacancies could be found and the distribution of the amount of Cd could be also obtained.

The detailed result will be shown in the presentation.

References

[1] M.Harada et al., Nucl. Instr. Meth. A 574 407 (2007).
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