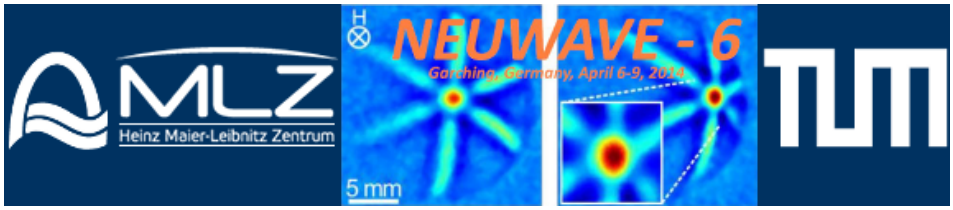

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Present status of Pulsed Neutron Imagign in Japan

Monday, 7 April 2014 10:20 (40 minutes)

We are developing the pulsed neutron imaging method and expanding application such as cultural heritage. Here, we introduce present status of the pulsed neutron imaging in Japan.
We have improved the RITS code to analyze martensitic phase. We introduced a Gausian distribution of lattice spacing to express realistic behavior in the martensite. From this analysis it is found the width increased toward the periphery, which indicating increase of martensitic phase in this region. The trend was very similar to that of hardess of the iron along radial direction.
As cultural heritage applications, Japanese swords were measured and in the transmission spectrum we found similar gradient Bragg edges to the martensite at edge area of the sword. We thought it was also martensitc phase. By analyzing this area by the RITS code, we succeeded in indicating the maretensitic characteristics. Coins were measured and it was indicated that texture changed depending on its produced age.
Hydrogen is one of important elements for NRG, and hydrogen storage material reseach is popular .We studied TiCrMo alloy, and at high content of hydrogen it showed a hump in neutron total cross section and no hump for low hydrogen content one. This indicated that metal hydride was formed at high content and probably relatively free hydrogen existed at low content. This suggests possibility to study hydrogen bound state depending on position.
With the use of resonance transmission we can obtain the elemental information. However, it is not easy to evaluate quantitatively. For this purpose we developed synthetic pulse function of the J-PARC neutron source and implanted it into the REFIT code. After then we succeeded in obtaining quantitative values.
Deectors are very important part of the pulsed neutron imaging. A camera type detector combined with a high speed camera and a high-resolution digital camera has been developed. A spatial resolution of several 10 □m was attained by the high-resolution camera and time-of-flight spectrum with 10□sec-channel width was obtained. A counting type detector of □-pic has been developed. DAQ system was improved to be compact and high speed data transfer, and it was proved to have a spatial resolution of about 100□m.

We have been performing pulsed neutron imaging under the project of JAEA, and collaborative work among Hokkaido University, JAEA, Ibaraki University, KEK and Nagoya University is on going. In the presentation we present outline of major activity and topics in obtained results.

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