Contribution ID: **184** Type: **INVITED SPEAKER**

Investigations on thin Fe films and Heusler alloy films using synchrotron-radiation-based Mössbauer spectroscopy

Tuesday 14 September 2010 09:40 (20 minutes)

Recent development in synchrotron-radiation-based nuclear resonant scattering or Mössbauer spectroscopy has opened up new aspects on investigation of materials in the measurements of hyperfine interactions and also of local phonon density-of-states. In Japan a five-year project led by Prof. Seto at Kyoto University is now in progress for further development of these unique techniques. The field of magnetic thin films is also getting a benefit from these new techniques through detection of magnetic hyperfine fields. The method which has mainly been used so far for thin film experiments is “time domain” measurements, where interference patterns of pulsed X-rays resonantly scattered by nuclei are detected as a function of time. However, “energy domain” measurements are more desirable for thin films, which often contain inhomogeneity in the nuclear environments. In our project, a new synchrotron-radiation-based “energy domain” Mössbauer spectroscopic method has been developed, and optimize

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Session Classification: COHERENT PHENOMENA, SYNCHOTORON RADIATION, QUANTUM OPTICS

Track Classification: Coherent Phenomena, Synchrotron Radiation, Quantum Optics