実験報告書様式（一般利用課題・成果公開利用）

（ ※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。 ）

CROSS TOKAI **Experimental Report** J-PARC	承認日 Date of Approval 2013/05/24 承認者 Approver Masayasu Takeda 提出日 Date of Report 2013/05/24
課題番号 Project No. 2012B0140 実験課題名 Title of experiment Depth profiling of the magnetic structure of Ni/FeMn thin films with perpendicular and in-plane magnetic anisotropies 実験責任者名 Name of principal investigator Kenta Amemiya 所属 Affiliation High Energy Accelerator Research Organization	装置責任者 Name of Instrument scientist Masayasu Takeda 装置名 Name of Instrument/(BL No.) SHARAKU/BL17 実施日 Date of Experiment 2012/12/10 9:00 - 2012/12/12 9:00 2013/3/20 9:00 - 2013/3/26 9:00

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。(適宜、図表添付のこと)
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

Cu/FeMn/Ni/Cu(100)
Cu/Ni/Cu(100) (reference)

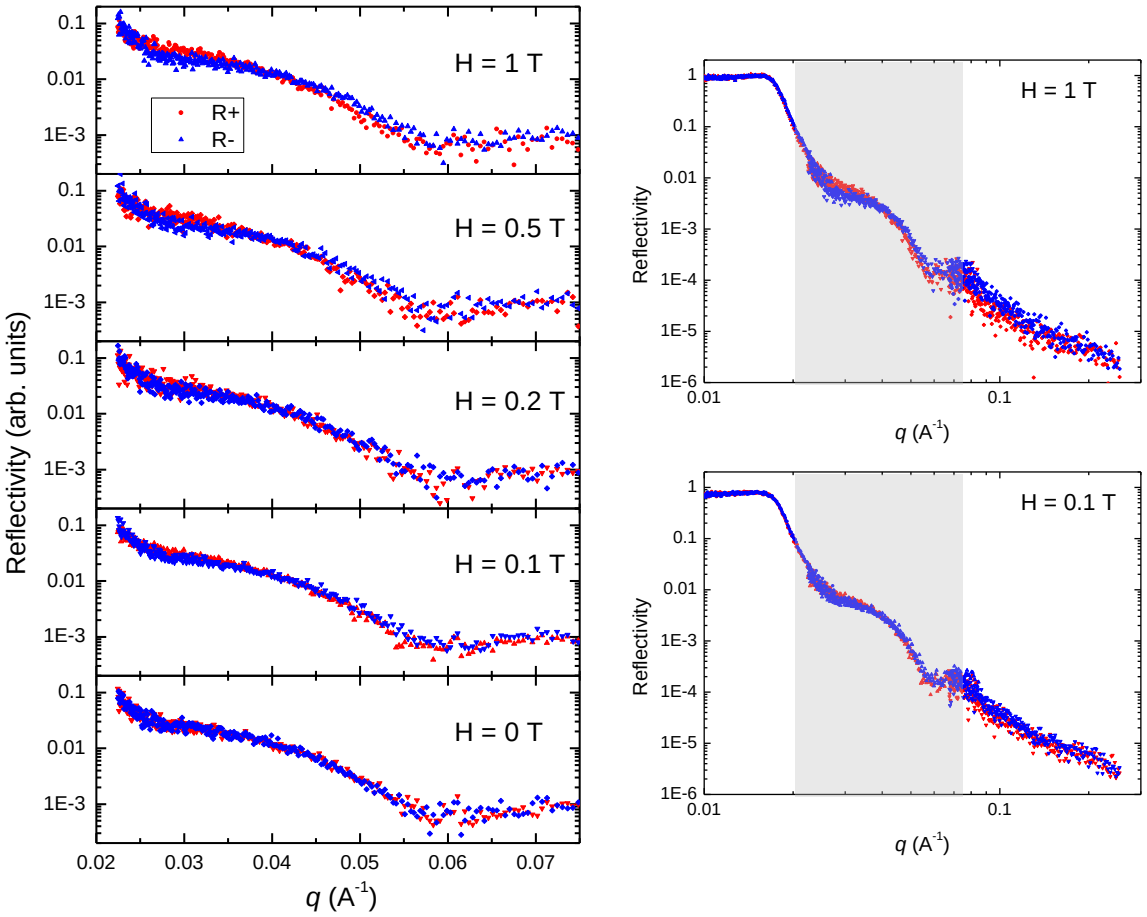
2. 実験方法及び結果 （実験がうまくいかなかった場合、その理由を記述してください。）
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

The polarized neutron reflectivity (PNR) data were taken at room temperature by adopting the incidence angles of 0.3, 0.9, and 2.7 deg. No spin analyzer was used.

The film configurations were chosen to be Cu(100 ML)/Ni(20 ML)/Cu(100) as a reference, and Cu(100 ML)/FeMn(25 ML)/Ni(16 ML)/Cu(100) for the sample. The sample has perpendicular magnetization at the remanence state. The magnetic fields of 0, 0.1, 0.2, 0.5, and 1.0 T were applied along the film plane in order to make magnetization of the sample lying in plane. Since the magnetic anisotropy energy of the sample is relatively small, the magnetic field of 1 T is enough to achieve the fully in-plane magnetized state.

2. 実験方法及び結果（つづき） Experimental method and results (continued)

Preliminary PNR data for Cu/FeMn/Ni/Cu(100) are shown below. A clear difference is recognized at 0.5 and 1 T between opposite polarizations of the incident neutron beam. Interestingly, a small signal remains even at a magnetic field of as low as 0.1 T, suggesting a local magnetic interaction at the interface.



The detailed analysis of the PNR data is now underway, and by combining with the X-ray magnetic circular dichroism data, the magnetic structure of Ni at the interface to antiferromagnetic FeMn will be revealed.

To the best of our knowledge, this is the first time to apply PNR to such thin films without a multilayer structure.