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**AN APPARATUS FOR THE SIMULTANEOUS
MEASUREMENT OF SURFACE MAGNETIC DOMAIN
STRUCTURE AND ELEMENT SPECIFIC MAGNETIZATION**

Y. LEE*, A. R. KOYMEN**, Y. KUK*

* 서울 대학교 나노연구단, ** The University of Texas at Arlington.

Scanning Electron Microscopy with Polarization Analysis (SEMPA) was used to image the surface magnetic domain structure of permalloy thin films in ultra high vacuum. The SEMPA system uses a compact Mott electron spin-polarimeter with a Th foil (operating at 25 keV) that has been attached to the back of a hemispherical energy analyzer. Two orthogonal in-plane components of the electron spin polarization were measured to obtain magnetic domain images with good contrast. Magnetic domain images on the SiFe(100) surface are used as an example. Cross-tie walls on the surface of permalloy thin films (350 Å Ni₈₃Fe₁₇) were observed at the boundary separating two oppositely magnetized domains. And also, the vector image of the cross-tie wall shows vortex structures which was predicted by theoretical simulation for the permalloy thin films. Additionally, the implementation of Spin Polarized Auger Electron Spectroscopy (SPAES) is described with an example of Fe(100) whisker sample.