Observation of surface magnetization by spin-polarized LEEM (SPLEEM)

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Dynamics of nanoscale magnetization is a topic of growing interest. Especially, it is important for application to magnetic devices such as high density and high speed data storages. Spin-polarized LEEM (SPLEEM) is so powerful tool to investigate the dynamics of surface local magnetization. Time evolution of surface magnetization can be observed at an interval of ~ 10 sec with a spatial resolution of ~ 10 nm by SPLEEM. To realize real time imaging of nanoscale magnetization, we are developing a new cathode.

As a first step of our SPLEEM study, we observed local magnetization by SPLEEM. More details will be presented in the conference. The figures show a result obtained by our instrument until now for Co adsorbed layer on a Ni substrate. (a) is a LEEM image and (b) is an image of surface magnetization by SPLEEM at the same area as (a). The field of view of the images is 50 μm. We can see contrast depending on direction of magnetization in (b), while the surface shows almost no contrast in (a). Between the white and the black area in (b), the direction of surface magnetization is inverted. Moreover, between the domains divided by the straight line in (a), the contrast of magnetization in (b) is also changed. The line is considered the grain boundary between the two domains, in which the directions of surface magnetization are different each other.