The collaboration research for the Dual Graduate School between VNU and JAIST

[Title of collaboration research]:

Studies on high coercivity of sputtered films and magnetism of diluted magnetic semiconductors

[The members of collaboration research]:

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[Reference home-page address]:

[Other references]:

http://www.jaist.ac.jp/~kkgi/thisyear/soe/00105soe.html

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Two research themes are planned of high coercivity of sputtered films and magnetism of diluted magnetic semiconductors.

The first study is concerned with the issue in the high coercivity in the magnetic films. The coercivity is dependent on magnetic anisotropy, grain size and various types of defects, therefore is affected very much by the preparation conditions such as annealing temperature. Fe-Pt thin film prepared by Ar ion beam sputtering is a candidate to examine for this problem.

The second one is the study on the structural and magnetic properties of diluted magnetic semiconductor such as ZnO with transition metal elements. Diluted semiconductors may have a great potential to be applied in new devices such as spin LED and spin FET. However, there have been controversial results; some of them are reported room temperature ferromagnetism, while others conclude paramagnetic behavior or spin-glass one in the samples. Precipitates of transition metal in a form of nano-cluster may be responsible for the observation of room temperature ferromagnetism. Structural characterization by neutron diffraction will be crucial to resolve the question. An XRD could not be sensitive enough to detect small amount of precipitates if there are.

Prospective effects of work:

Learning preparation methods of thin films and structural examination of them should be a good experience to a newcomer in this solid state physics. The use of advanced machines such as an X-ray diffraction, a neutron diffraction, a SQUID magnetometer, … will be a useful experience during the study of a current topic in highly correlated electron systems of thin film recording materials and thin film diluted magnetic semiconductors.