## Investigation of micro-magnetic structures by using scanning transmission X-ray microscopy

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X-ray magnetic circular or linear dichroism(XMCD/XMLD) has been the representative magnetic measurement technique utilizing synchrotron radiation for last three decades due to its element specific magnetic sensitivity. Recently, the traditional simple XMCD/XMLD measurement technique is evolved into more advanced techniques with additional functionality. Scaning transmission x-ray microscopy(STXM) is recently emerging as a powerful advanced technique to investigate various mangetic phenomena such as heavy metal/ferromagnetic metal bi-layer system and magnetic two-dimensional materials due to its nanoscale spatial resolution combined with element specific magnetic sensitivity based on XMCD and XMLD. By using STXM, we successfully measured the microscopic magnetic domain structure of Co/Pt bilayer systems. By applying external magnetic field in out-of-plane direction, we observed the evolution of magnetic domain from maze-type structure to skyrmion–like bubble structures. We also investigated the changes of thess bubble domain structures under the influence of in-plane external magnetic field to identify the character of domain-wall of bubble type magnetic domain. In case of locally oxidized graphene layers where the ferromagnetic order was observed with magnetic force microscopy, we identified the origin of ferromagnetism based on element specific measurement with STXM.