RCMS・IGER Seminar

"Novel Spectroscopic Methodology for Materials Science"

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Date : Wed 27th Nov 15:00 – 16:30
Place : SA329

Abstract: Exploitation of spectroscopic methods for the characterization of functional materials is an always important issue to match the technological requirement of the structural and functional analysis of novel materials. The first topic is the development of novel magnetic microscope based on photoelectron emission microscopy using ultraviolet magnetic circular dichroism for the investigation of ultrafast magnetic dynamics [1]. Although it has been believed that the ultraviolet magnetic circular dichroism is too weak for magnetic microscope, our discovery of huge enhancement of the photoelectron magnetic circular dichroism at the work function threshold [2] allows us to exploit the new magnetic microscope by which ultrafast or real-time magnetic dynamics can be examined in laboratory. The second topic is the exploitation of ambient pressure hard x-ray photoelectron spectroscopy. Usually, x-ray photoelectron spectroscopy should be performed under ultrahigh vacuum because of a short photoelectron mean free path. Using hard x-rays, however, since the electron mean free path is significantly elongated due to much higher electron kinetic energies, ambient pressure x-ray photoelectron spectroscopy can be realized. We have successfully exploited hard x-ray photoelectron spectroscopy up to 3000 Pa for the in situ measurement of working fuel cells. Although the project is still at the early stage, some recent results will be presented. If the time permits, other topics based on the spectroscopic characterization of various functional materials such as metal phthalocyanine thin films [3], huge coercivity thin film magnet [4], and Invar alloys [5].

[1] T. Yokoyama, T. Nakagawa and Y. Takagi, *Int. Rev. Phys. Chem.* **27** (2008) 449-505. [2] T. Nakagawa and T. Yokoyama, *Phys. Rev. Lett.* **96** (2006) 237402. [3] K. Eguchi, Y. Takagi, T. Nakagawa and T. Yokoyama, *J. Phys. Chem. C*, in press. [4] T. Nakagawa, Y. Takagi, T. Yokoyama *et al*., *Phys. Rev. B* **86** (2012) 144418. [5] T. Yokoyama and K. Eguchi, *Phys. Rev. Lett.* **107** (2011) 065901; T. Yokoyama and K. Eguchi, *Phys. Rev. Lett*. **110** (2013) 075901

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