BL12B2
NSRRC BM

The contract beamline BL12B2 is part of the Taiwanese X-ray facility at SPring-8, serving for materials and biological structure researches. Facilitating with four experimental stations, the beamline is capable of conducting high quality X-ray experiments, such like X-ray absorption spectroscopy, powder X-ray diffraction, X-ray scattering and protein crystallography. The beamline has been thus designed that the multi-detecting environment of the beamline allows the users to combine more than one detecting technique in order to fulfill their specific experimental needs. The beamline started her user operational mode since 2001B period and has generated up to the end of 2005 more than 60 publications with some high profile papers.

In 2005, however, because of the completion of six hard X-ray beamlines in National Synchrotron Radiation Research Center the mother facility in Taiwan, the user pressure at BL12B2 was thus deduced which had reflected in the number of users being conducting experiments at BL12B2, that was 157 user-runs in 2005 compared to the historical peak 205 in 2003. Specifically most of the X-ray absorption spectroscopic measurements under 20keV have been redirected to the newly built XAF/XRD beamline BL01C in Taiwan. In order to preserve the high performance of the beamline, the operational policy of the beamline had been accordingly changed to allocate more beamtime to those experiments requests longer measurement time and more photon flux. Similar to the Power User Project at SPring-8, several user groups were intentionally chosen to grant more beamtime.

In hardware, the 6-circle diffractiometer was replaced by a new Huber 7-circle diffractometer. It modifies the conventional Huber 6-circle diffractometer with one additional vertical rotational axis designed to provide the diffractometer extra degree of freedom in grazing incident scattering geometry in surface detecting. The supporting table for the diffractometer was also redesigned.

In research, there were total 37 experiments (excluding experiments from *Microgravitorial and Industrial Proteomics with Synchrotron radiation*, MIPS) conducted at BL12B2, including 18 in materials researches and 19 in bio-structure researches. The beamtime allocation was followed by a 50-50 policy, that was 50% beamtime for materials researches and 50% for bio-structure researches. To name a few, in materials research, in additional to the on-going researches, in 2005, there were new proposals for the study of local valence structure of Fe in Fe_3Si/GaAs(001) (H-H Hung of NSRRC, M-H Honag and R-N Kuo of NTHU), *in-situ* XRD study of porous SiO_2 films (K-R Chao of NTHU), structural determination of drug compounds by XRD (H-S Sheu of NSRRC), lattice distortion and magnetic structure studied by resonant X-ray scattering (C-H Du of Tamkang U), surface morphology and size distribution of FePt nano-particles on functional modulated substrate studied by anomalous GIXS (K-L Yu of NSRRC and C-H Lee of NTHU), Ni/YSZ thin film of a solid oxide fuel cell by plasma spray studied by SAXS (C-H Lee of NTHU).

To highlight, a long term research topic starting since the first beamline operation had resulted a fruitful output in 2005. The group led by B-J Hwang of NTUST had successfully applied *in-situ* X-ray absorption spectroscopy to study the early formation mechanism of bi-metallic clusters. Their studies have provided invaluable knowledge in atomic resolution in understanding the nucleation and growth of bi-metallic nanoparticles, specifically in those with industrial importance Pt/Ru, Pd/Ru. Pd/Pt and Cu/Pd [1,2].

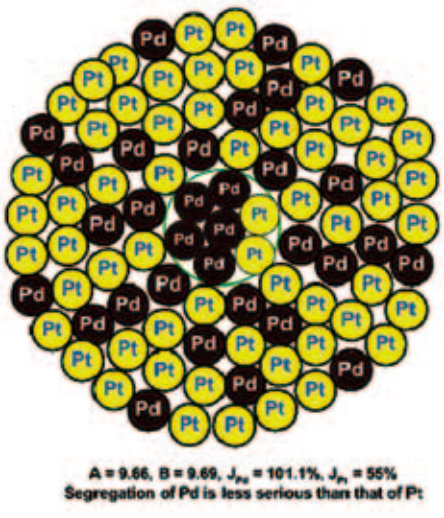

Figure : the atomic representation of the Pd/Pt bimetallic nanoparticle structure based on EXAFS results[2].

Acknowledgements

We would like to express our greatest thanks to SPring-8 staffs for their constant support and help.

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M.-T. Tang and K.-L. Yu
NSRRC, Taiwan.