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Asia Research Center and Universities' Research Centre of Yangon University: Two Sides of the Same Coin

Yangon, Myanmar

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Abstract

Rigaku Multiflex 2KW Powder X-ray Diffractometer (XRD) has been installed and running in the Universities' Research Centre of Yangon University (URC-YU) since FY 2001-2002. The "life" of a sophisticated instrument is about 10 to 15 years; after this time, it usually needs to be renovated. With the financial support of the Asia Research Centre at Yangon University (ARC-YU) project, URC-YU has successfully retained or restored the XRD into a good running condition. The XRD spectra of SiO_2 and TiO_2 nanoparticles have been observed.

Introduction

The Universities' Research Centre of Yangon University (URC-YU) is a multi-disciplinary research laboratory established in 1985. To assist the implementation of Special Four-Year Plans and Thirty-Year Long-Term Education Development Plan (FY 2001-02 to FY 2030-31), Myanmar has been upgrading research facilities at all higher education institutions. As well, *Rigaku Multiflex 2KW Powder X-ray Diffractometer (XRD)* has been installed and running in the URC since FY 2001-2002. The life of such a sophisticated instrument is about 10 to 15



Fig. 1: Rigaku Multiflex 2KW Powder X-ray Diffractometer at URC-YU



Fig. 3: High Voltage Cable



Fig. 2: X-ray Tube Holder and X-ray Tube

years; after this time, it usually needs to be renovated. It will be necessary to find funds to purchase some spare parts of the existing equipment and to buy additional equipment if URC is to continue to operate

and become a first class analytical laboratory. It is clear that substantial funds will be needed for the foreseeable future for the URC to continue to operate efficiently and to provide the extra services to researchers. It is also clear that such funding would almost certainly have to be obtained from the governmental sources, foreign governmental aid program or foreign agency/organization/foundation funding or combination of these sources.

KFAS-supported ARC at Yangon University

The Korea Foundation for Advanced Studies (KFAS) supports research activities in Yangon University through the Asia Research Center (ARC-YU). In the year 2010-2011, ARC-YU funded eleven research projects. The ARC-YU project named "X-ray Diffraction Study on Nanoparticles" provided the financial

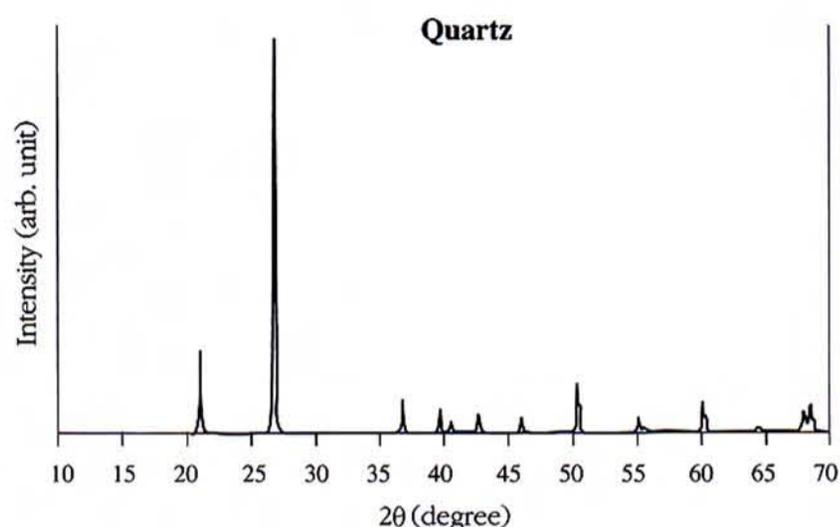


Fig. 4: XRD pattern of single phase Quartz (SiO_2) obtained by using Rigaku Multiflex Powder X-ray Diffractometer

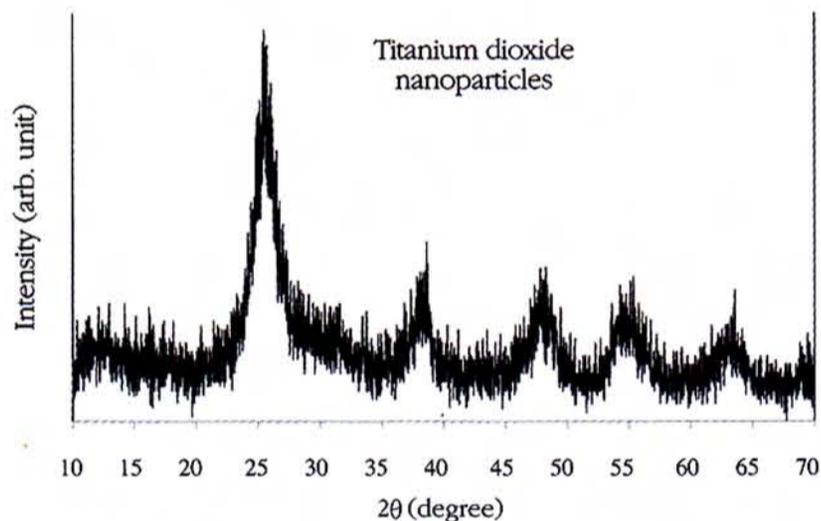


Fig. 5: XRD pattern of single phase Titanium dioxide (TiO_2) nanoparticles obtained by using Rigaku Multiflex Powder X-ray Diffractometer

assistance to the URC-YU effort to restore the existing X-ray diffractometer into good working condition.

XRD in Maintenance

Scattering of incident x-rays by crystal atoms (atomic planes) produces a diffraction pattern that yields information about the structure of the crystal (see Rigaku Multiflex 2KW Powder X-ray Diffractometer in Fig. 1). The current X-ray tube was burnt out and showed low voltage error. Therefore, the new X-ray tube (Fig. 2) with its high voltage cable (Fig. 3) was installed. Goniometer gear was lubricated on to get more efficiency. Oxidation of lead was found inside the X-ray tube holder because cooling water was too cold to be compared with the

environment at about 28°C . Oxidation of lead was cleaned by polishing inside the X-ray tube holder.

XRD in Action

The X-ray Diffraction (XRD) patterns of the Quartz (SiO_2) and Titanium dioxide (TiO_2) nanoparticles were obtained to evaluate the function of X-ray diffractometer. The phase identification of the samples was performed by using X-ray diffraction Technique. The observed XRD patterns of single phase SiO_2 and TiO_2 nanoparticles are shown in Fig. 4 and Fig. 5. The peaks of the TiO_2 nanoparticles are more broaden than that of the SiO_2 samples. The broadening of the peak comes from the effect of very small size of the particles. The

crystallite size of the SiO_2 and TiO_2 samples were calculated from the full width at half maximum (FWHM) and the diffraction angle (2θ) by using Scherrer equation and found to be around 38nm and 11nm respectively. The calculated values of the crystallite size were well agreed with the shape of the peaks in the XRD patterns. These observations have been confirmed that the renovated Powder X-ray Diffractometer (XRD) is functioning well under the engineering maintenance in URC.

Two Sides of the Same Coin: ARC and URC of YU

All actions have been successfully taken for retaining or restoring the Rigaku Multiflex Powder X-ray Diffractometer

2010-2011 International Scholar Exchange Fellowship (ISEF) Laureates from Myanmar

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From September 2010 to August 2011, the following two scholars from Yangon University are conducting research in Korea as International Scholar Exchange Fellows supported by the Korea Foundation for Advanced Studies.

- Ye Chan, Universities' Research Center, Yangon University
- Yin Yin Myint, Department of Chemistry, Yangon University

Since 2001, a total of twenty-three Myanmar scholars received the fellowship to spend one year researching in Korea at various universities and research institutions. Seventeen scholars were from Yangon University and six from Mandalay University.

into a state in which it can perform its required function. The XRD spectra of SiO_2 and TiO_2 nanoparticles have been observed to evaluate the function of X-ray diffractometer. The observed diffracted peaks at their usual diffraction angle (2θ) have proven that the existing equipments have been maintained in good working condition thanks to the URC-YU effort and the KFAS supported ARC-YU funding. To a researcher in Yangon University, ARC-YU and URC-YU should be seen as the two sides of the same coin in much the same way as financial support and research activity should be regarded.