

Small Angle X-ray Scattering at Siam Photon Laboratory

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A Small Angle X-ray Scattering (SAXS) beamline has been constructed at the Siam Photon Laboratory (SPL) of the Synchrotron Light Research Institute (SLRI). The SAXS beamline is dedicated for nano structural characterization of materials. The synchrotron light originated from a bending magnet is monochromatized using a Double Multilayer Monochromator (DMM) to provide x-ray in the energy range of 6–9 keV. A toroidal mirror is used to focus x-ray to the sample position. The experimental station is equipped with a CCD detector, in which the sample-detector distance can be extended to up to 4 m. The beamline has been commissioned and opened for users in March 2011. The commissioning result of the beamline, including SAXS measurement of nano particles, is presented.

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I. INTRODUCTION

SAXS is an important non-destructive tool for structural characterization of materials that has electron density fluctuation on the length scale of approximately 1–100 nm [1, 2]. It provides information about size and shape of the sample nano-structure. Since variety of materials such as powder, solid, liquid or fibers can be used as a sample for SAXS measurements, this technique is proven to be useful in many fields of research, such as polymer sciences, nano-physics and structural biology. In order to facilitate the growing community of nano-scale research, a SAXS beamline was constructed at SLRI. The beamline BL2.2: SAXS is the first dedicated SAXS station in Thailand. The construction of the beamline was completed and opened for users in March 2011.

II. PHOTON SOURCE AND BEAMLINE OPTICS

II-1. Photon source

The Siam Photon Source (SPS) is a 1.2 GeV synchrotron light source of Thailand [3]. It is operated at the maximum beam current of 150 mA. The SAXS beamline utilizes the synchrotron radiation from a bending magnet of the SPS. At the photon energy between 6–9 keV, the calculated photon flux density of above 10^{11} photons/sec/0.1% BW/mrad²/mm² is obtained [4]. Fig. 1 illustrates the schematic diagram of the SAXS beamline. The positions

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