

HIGH RESOLUTION X-RAY MICROPROBES AND THEIR APPLICATIONS

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Australian Synchrotron is in the routine operation since 2007. Eight beamlines are already in operation and one is in the construction phase. The speaker has been involved in several new projects, such as:

(a) High resolution imaging. Recent results achieved at the existing laboratory topographic systems in Australia allowed obtaining a resolution down to 1 μm for 2-dimensional (2D) and 3-dimensional (3D) imaging. There is a growing demand in Australia for a synchrotron based imaging system with spatial resolution below 50nm. And several groups from Monash University have been using Transmission X-ray Microscopy (TXM) systems at ALS in USA and BESSY II in Germany. The speaker has been also involved in development of a unique high resolution imaging beamline that will involve Transmission X-ray Microscopy (TXM),

Infrared Microscopy (IRM) and Confocal Microscopy (CM).

(b) Single cell irradiation. Targeted irradiation to sub-cellular components enables the investigation of the radiation response contribution from organelles and cellular compartments such as the nucleus and the cytoplasm. We used a microbeam for single cell and microbeam radiotherapy (MRT) investigations at the Photon Factory in Japan. We targeted nuclei or cytoplasm with a $10 \times 10 \mu\text{m}^2$ X-ray microbeam with 5.35 keV to investigate the DNA damage response. While in Australia he has been also involved in the development and applications of high resolution live cell irradiation facilities with X-rays which also will be discussed. Experimental data from Photon Factory in Japan and Australian Synchrotron in Melbourne will be presented.