

## DEVELOPMENT OF A NEW DIFFRACTOMETER FOR THE EVALUATION OF VERY MICRO AREA

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### Introduction

As time has progressed the features of electronic devices have become smaller and smaller. Furthermore, these features are becoming increasingly complex as a result of the introduction of new processing techniques such as 3D multilayers, etc. To probe these features, X-ray diffraction methods, mainly crystal phase identification, orientation analysis, stress measurement, etc., are used. However, the current situation is such that the existing instruments irradiate a sample area down to 100  $\mu\text{m}$ . Illumination of sample areas on the order of a few microns is available using synchrotron radiation, but then requires sending both the sample and personnel to a synchrotron to perform the measurements, which can be an inconvenience.

### System configuration

A rotating anode X-ray generator with a brightness of 56  $\text{kW}/\text{mm}^2$  provides a high-brightness X-ray spot. A multilayer optic is used to condition the spatial and spectral properties of the beam supplying a focused and monochromatic beam on the sample. The detector is newly designed imaging plate (IP) system. The IP has the advantage that it can be easily formed into a cylinder which provides a superior capture. Because there is no dark current, long exposures are possible.<sup>1)</sup> This combination of components provides a system capable of measuring properties such as the smearing due to particle size distribution and changes in phases due to processing on features as small as 10  $\mu\text{m}$ .

We will present examples of measurements in the 10  $\mu\text{m}$  regime to demonstrate the utility of this new instrument.

### Summary

The diffraction analysis of areas down to 10  $\mu\text{m}$  is enabled by the combination of high-brightness X-ray source, focusing optics, a high-precision goniometer and large area imaging plate detector.



Fig.1. Rapid191 system

### Reference

- 1). C. Wilson et al, 26<sup>th</sup> European Crystallographic Meeting, MS47-P03.