

## Development of a new Auger-photoelectron coincidence spectroscopy (APECS) apparatus using a coaxially symmetric mirror analyzer and a miniature cylindrical mirror analyzer

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### Introduction

Auger-photoelectron coincidence spectroscopy (APECS) is an ideal tool to investigate minor Auger processes such as site-specific Auger and cascade Auger. So we have developed a new APECS apparatus using a coaxially symmetric mirror analyzer and a miniature cylindrical mirror analyzer (CMA) [1].

### APECS apparatus

We have constructed a miniature CMA with a diameter of 26 mm (Fig. 1). It consists of a shield for electric field, inner and outer cylinders, a pinhole with a diameter of 1.0 mm, and an electron multiplier.

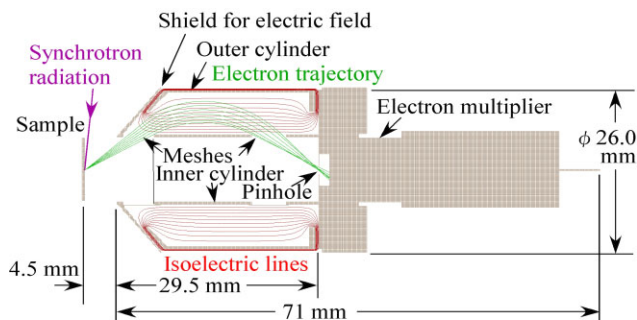


Figure 1. The miniature CMA [1]

By assembling the CMA in a coaxially symmetric mirror electron energy analyzer (coASMA) coaxially and confocally we developed an analyzer for APECS (Fig. 2). The performance was tested by measuring Si LVV Auger – Si 2p photoelectron coincidence spectra of a Si(111) surface (Fig. 3). Features of the APECS analyzer are as follow. 1) The APECS signal detection efficiency of the analyzer is improved by one order of magnitude from previous ones because of the large solid angle of the coASMA and the CMA. 2) The positioning is quite easy, because the coASMA and the CMA are assembled confocally on a rod with a mechanism for xyz positioning and tilt adjustment. 3) It can be installed to a general purpose ultrahigh vacuum chamber because it is constructed on a 203-mm-outer-diameter conflat flange.

4) The production cost is low because the structure is simple and the number of the parts is relatively small.

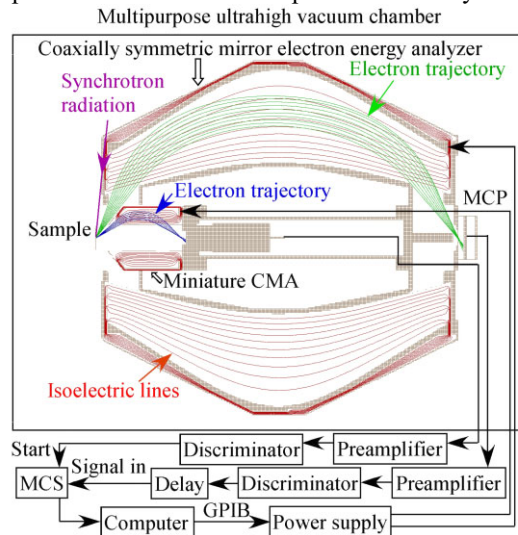


Figure 2. The APECS apparatus. [1]

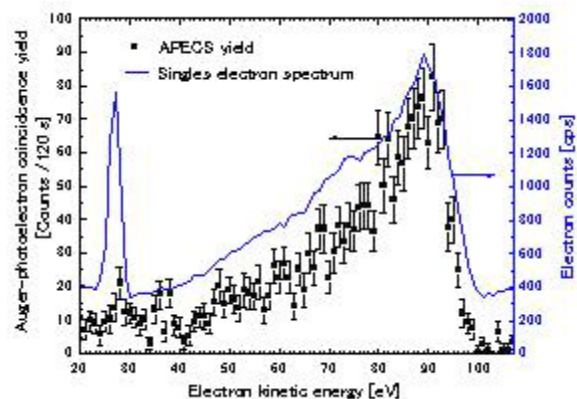


Figure 3. Si LVV Auger – Si 2p photoelectron coincidence spectra of a Si(111) surface [1].

### References

[1] K. Mase, E. Kobayashi, M. Mori, Y. Kobayashi, S. Terashima, K. Okudaira, N. Ueno, J. Vac. Soc. Jpn. 47 (2004) 334-338 (in Japanese).

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