Development of the EUV detector for BepiColombo mission

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The atmosphere of Mercury is very tenuous, with a pressure of a fraction of pbar. It results from a complex interplay of the solar wind, its planetary magnetic field and its rocky surface. From Mariner-10 UV measurements and telescopic optical spectroscopy from Earth, six elements have been identified: H, He, O, Na, K, and Ca. Other species are expected: e.g. H2, OH, possibly released by impacting bodies, noble gases, both non-radiogenic (Ne) and radiogenic (Ar, Xe). All species representative of the surface composition, directly sputtered from the regolith, should also be present.

In order to reveal the composition of the atmosphere more properly, the PHEBUS (Probing Of Hermean Exosphere By Ultraviolet Spectroscopy) instrument on MPO (Mercury Planetary Orbiter) will explore Mercury. The instrument is basically composed of two Ultra-Violet spectrophotometers and one scanning mirror. The movable mirror collects the light from the atmosphere above the limb and directs it to the spectrometers. Two toroidal holographic diffraction gratings cover the EUV (50-150 nm) and FUV (110-330 nm) region.

A consortium composed of three main partners implements it. JAXA (Japan) provides the detectors and the main entrance mirror, IKI (Russia) implements the scanning system, and SA/IPSL (France) takes in charge the design, assembly/test/integration, and also provides three small detectors (zero order monitor, Ca and K channels).

In our presentation we report the status of development of the EUV detector. It consists of a 2-D photon-counting micro channel plate (MCP) and resistive anode encoder (RAE). To enhance the quantum efficiency (QE), the method of evaporating photocathode on the top MCP face is widely used. However, there are so many debates on technical issues in vacuum evaporation. To clear up these issues we measured the QEs of photocathode-coated and bared MCPs, and the angle dependence of them. RAE receives the electron cloud from MCPs and encodes the event's location by distributing the charge signal among four output terminals. The design involves terminating the edges of uniform resistive surface by four concave circular arcs with line resistivity corresponding to its curvature. So far, the ratio of the sheet resistivity to the line resistivity is thought to be an only limiting condition for determining the geometry, but we thought that the ohmic value affects the pulse height distribution. So we examined the

relation between them. The detector is protected from air during ground operations by a movable cover equipped with MgF2 window. This cover will be opened after the launch and kept open during the whole operational phase. We confirmed the seal performance of a rubber O-ring used for the sealing part of the cover.