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5 December 1991

LODGEMENT RECEIPT FOR PROVISIONAL SPECIFICATION

Applicants: Gerasimos Daniel Danilatos

Title: Charge and signal controller of the gaseous detection device
in the environmental scanning electron microscope

The following documents were lodged at the Patent Office on the
29 November 1991 and allocated provisional application No. PK9786.

Documents: A provisional specification, including
a request form.

Fees Paid: \$75.00 (being the CORRECT fees)

Please note that lodgement of the provisional application does not
entitle the applicant to claim that a patent has been granted.

You are reminded that in order to claim association with this
application a complete application must be lodged on or before
29/11/1992. Brochures explaining the requirements of a complete
application can be obtained from this Office or a Sub Office
located in each state capital. The application No. PK9786 should
be used in any further correspondence with the Office.

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PROVISIONAL SPECIFICATION

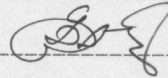
I certify that the following TWO pages are a true and correct copy of the original provisional specification lodged in respect of an invention entitled Charge and signal controller of the gaseous detection device in the environmental scanning electron microscope.

Name of Applicant Gerasimos Daniel DANILATOS

Signature 

CHARGE AND SIGNAL CONTROLLER OF THE GASEOUS DETECTION
DEVICE IN THE ENVIRONMENTAL SCANNING ELECTRON MICROSCOPE.

G. D. Danilatos



The aim of this invention is to improve the performance of the environmental scanning electron microscope (ESEM) and in particular of the gaseous detection device (GDD) used in conjunction with the ESEM. This improvement is achieved by inserting a conducting electrode (grid, mesh etc.) between the specimen and the biased electrode of the GDD. A schematic diagram attached herewith exemplifies the concept: The electrode (controller) may be biased with a variable positive or negative voltage (V_c). The controller prevents the accumulation of charge on insulating specimens, in particular on those specimens which have relatively large dimensions (e.g. wafers). In addition, the controller determines which type of signal from the specimen will be detected by the GDD (detector), such as secondary or backscattered electrons. For example, if the electrode of the detector is biased with 400 volts and if no controller is present, then the positive ions formed in the gas will accumulate on and around the specimen area under observation and, thus, they will raise the potential of the specimen surface with a concomitant effective decrease of the potential difference which the signal electrons traverse; the result of this is severe decrease of gaseous gain, deterioration of the signal-to-noise-ratio and periodic specimen discharge and image instability. These phenomena are particularly apparent with extended insulating specimens. However, the presence of the controller eliminates this problem. The bias of the controller can be zero, plus or minus a few volts and plus or minus tens of volts, which will result in filtering signal electrons with particular energies. The geometry, position and bias of the controller may be adjusted to suit a particular application.

The charge and signal controller can be used in conjunction with various forms of the GDD, such as the ionization GDD or the scintillation GDD. The present device can be an integral part of a multi-electrode GDD.

This invention broadens the scope of applications of the ESEM.

Charge and signal controller
G.D. Danilatos

