

SPM Gain

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Introduction

The microcells of an SPM are comprised of a Geiger mode photodiode in series with an integrated quench resistor. A microcell provides a fixed amount of charge every time the microcell undergoes Geiger breakdown and this charge signal is independent of the number of photons that initiate the output. As a result individual microcells do not provide optical intensity information. However, intensity information is recovered in an SPM since it consists of a large number of microcells arranged in parallel and connected to a common output. In this configuration the SPM response is proportional to the number of microcells undergoing Geiger breakdown, which is in turn proportional to the incident photon flux.

The gain of a microcell is defined as the ratio of the output charge per breakdown event to the charge on an electron. Figure 1 below shows the typical bias dependence of the microcell gain at room temperature and at -20°C . The gain is a linear function of the applied bias.

The gain is readily measured from the separation of peaks in the single photoelectron spectrum, which is detailed in another Technical Note.

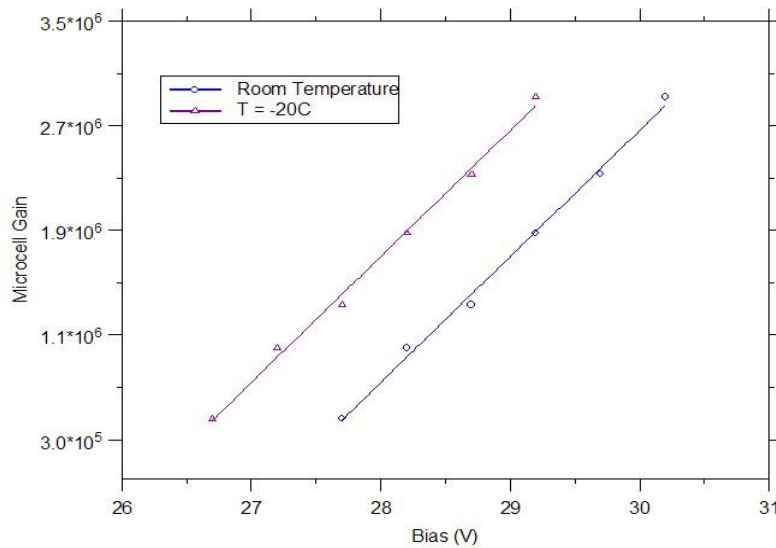


Figure 1. Gain of SPM microcells as a function of bias