PocketPico Picoammeter: Photoemission Spectroscopy

I. Electron Spectroscopy

Photoelectron spectroscopy, or photoemission spectroscopy (PES) is a quantitative spectroscopic technique that measures the energy state of elements in a material through electron spectrum. The PocketPico Picoammeter can be used to align any beam of positively charged ions that allow the ammeter to behave as a current sink.

II. Beam Alignment

An illustration of a PES measurement setup is shown in Figure 1, which would exist in a vacuum chamber. The setup consists of a positive source which creates photo-generated electrons upon impact with the sample. The electrons are then reflected into electron multiplier for analysis. Assuming that the sample plate is referenced to GND, the sample plate and sample are conductors that act as a Faraday plate which generates a positive current. The current induced by bombardment can be measured directly from the metal specimen with the PocketPico Picoammeter through the chamber. The ammeter is used to determine if the ion stream is correctly aligned with the sample.

The PocketPico is a current sink, and therefore the reference voltage for the summing node must be less than the voltage at the source so that the PocketPico will sink current [1], [2]. The PocketPico Picoammeter can be used for any ion beam alignment application as long as the current does not exceed 2mA and current is positive and care should be taken to not have the current into the PocketPico device exceed the measurement range. A resistor or fuse between the Faraday plate and the ammeter is suggested if sudden discharges are possible or expected.

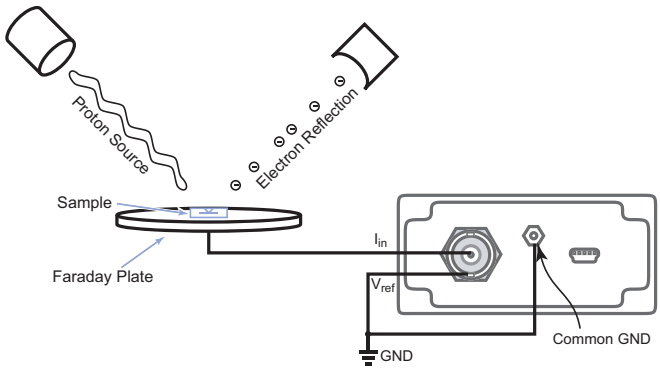

Fig. 1. The PocketPico is used for beam alignment with the sample with the Faraday plate referenced to GND through the picoammeter reference pin.

Version 1.0.0, Brian Degnan, June 16, 2011.

The PocketPico Reader software can be used to show instantaneous current readings, or save the current readings over time to a comma separated value file.

References

[1] Ix Innovations, LLC., "Pocketpico picoammeter instruction manual," http://pocketpico.com/download/pp_manual_1.0.pdf.

[2] Brian Degnan, "Ammeter theory of operation," http://pocketpico.com/download/theoryofoperation.pdf.