Summary of our article, overview of the organization of its content

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The degradation over time of the quantum efficiency of an aluminium-made photocathod is studied through XANES spectroscopy; a photoinduced gas desorption mechanism is found to be responsible for the observed variations.

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This document presents the new clarified structure of the article. The content is the same as in the 0^{th} version of september 2015, it as only been reorganized and simplified. By focusing on the Al cathod, we avoid those confusing back and forth explanations between the different photocathod materials which would be all the more useless as only the Al case is actually conclusive. Also, I don't mention the use of the nickel foil (that originally measures the intensity of the incident X-Ray beam for normalization) as a second photoelectron detector, since this particular use doesn't appear to be reliable.

I. INTRODUCTION

II. EXPERIMENTAL SETUP

A. Photocathod

Description of the Al cathod, the different treatments applied to it, and the vacuum chamber in which it is placed.

B. Quantum Efficiency measurement

Definition of the QE, description of the laser source and the detection apparatus.

C. XANES investigation

Presentation of the X-Ray source, of the specific edge of Al investigated, and of the detection apparatus. A table summarizes here the different conditions in which sets of scans were recorded for the Al photocathod.

III. RESULTS

A. Evolution in the Quantum Efficiency

Exponential decrease of the QE throughout both a scan and a set of scan [*figure*].

B. Evolution in the XANES spectra

Normalization process, evolution of the second peak of the spectra [*figure*], correlation with the QE [*figure*].

C. Residual gas analysis

Pollution of the vacuum chamber

IV. DISCUSSION

A. Influence of UV irradiation

Double exponential decay over each scan, correlation of fitted cross-sections with the laser power [*figure*], scenario of photoinduced desorption.

B. Influence of the pressure

Correlation between the QE and the pressure [*figure*], assumed mechanism of readsorption following the XANES measurements.

C. Comparison with different experimental conditions

Other tests conducted with different scan durations and time spacings; with a different surface conditioning (raw, before repolishing); with a different material (AlLi); in the presence or not of a photoemission-stimulating electric field. Each time, the UV power and the pressure dependancies were clearly confirmed [*small format figures*] (even though all those parameters were not always varied independantly).

Mg was tested, but its QE wasn't steadily measurable.

D. Possible chemical processes

Hypothesis of CO2 adsorption, and of H2O adsorption; comparison with related works.

V. CONCLUSION