Docket #: S13-018

Enhanced photoelectron sources using electron bombardment

Stanford researchers have designed a method to increase the photoyield of thin film CsBr/metal photocathodes by activation with electron bombardment, allowing efficient operation at UV and longer incident light wavelengths. The CsBr photoelectron source provides new means for generating pulsed X-rays by pulsing the excitation optical source. This will allow pulsed X-ray and electron imaging for applications in mass spectroscopy, medical diagnosis imaging, industrial inspection and imaging, as well as biological studies. The small size and low voltage required for powering the electron source can enable portable applications.

Figure

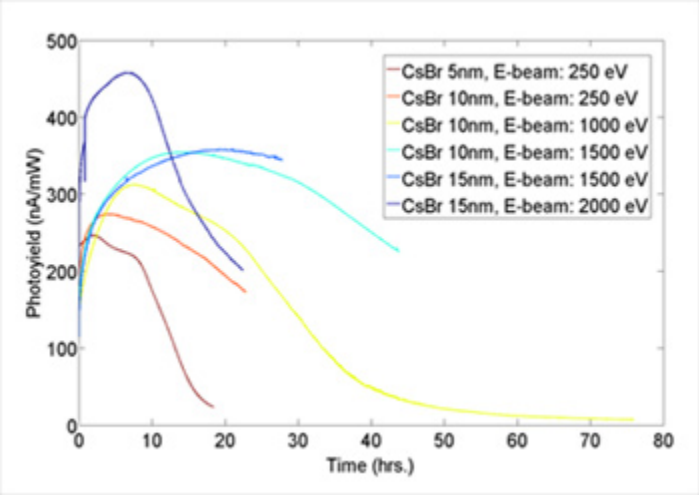


Figure description - Preliminary experimental results obtained with 405nm laser after the CsBr/Au sample was exposed to equivalent electron doses under different sample thickness and conditions.

Stage of Research:

- Results show photoemission enhancement from color centers induced in CsBr films by low energy e-beam radiation.

- Continued research to determine optimum energies for bombarding electrons for different thicknesses of CsBr films to maximize photoyield and preserve lifetime due to ablation.

Applications

- **The proposed electron source has many potential applications including:**
  - Differential Phase Contrast (DPC) imaging for Medical Imaging and Industrial Inspection and Imaging
  - Mass spectroscopy
  - Compressive imaging
  - Biological studies

Advantages

- Allows for operation of photocathodes with relatively inexpensive lasers
- The small size and low voltage required for powering the electron source enable portable applications
- The photoelectron source for creating an X-ray source can be pulsed and attain many shapes
- The shaped optical beam used for generating electrons can be shaped in almost any form
- The photocathode material can be changed to CsI, or other alkali material combination. Other electron beam energy or CsBr thickness may be utilized.

Publications

- Maldonado JR et al. A cesium bromide photocathode excited by 405 nm radiation. *Appl. Phys. Lett.* 105, 021108 (2014).

Patents

- Published Application: 20140265828
- Issued: 9,406,488 (USA)

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