National Aeronautics and
Space Administration

technology solution

Electrical and Electronics

Microfabrication process for building x-ray absorbers

A novel process for fabricating overhanging thin film x-ray absorbers optimized for soft x-ray spectroscopy.

NASA Goddard Space Flight Center has developed a new microfabrication process designed to yield overhanging thin film x-ray absorbers optimized for soft x-ray spectroscopy. For these applications, it is necessary to have a large absorber viewing area per pixel, few contact points to both the temperature sensor and substrate, and an absorber that is thick enough to stop a sufficient number of incident photons and thermalize quickly, but thin enough to keep heat capacity at acceptably low levels. To meet these criteria, we have developed an innovative microfabrication process in which a large electron-beam evaporated gold absorber is supported by small gold stems that are electroplated in a photoresist mold. The process is completed at low temperatures to prevent plastic deformation of the stem photoresist mold.

BENEFITS

- Improved energy resolution
- Provides a count rate of approximately 10 k cps
- Characterize small features at very low beam voltages"

THE TECHNOLOGY

A thin (0.3 um) e-beam evaporated gold absorber is supported by small gold stems that are electroplated from the temperature sensor and substrate upward. The process is kept at temperatures less than 65C to prevent plastic deformation of the photoresist stem template. This is accomplished by using no reflow of the mold photoresist, curing the absorber-masking photoresist with UV exposure and a long, low temperature bake instead of a standard high temperature bake, and etching of the absorber using a wet chemistry at room temperature instead of the high temperature ion mill step. The completed absorber stops x-rays of energy less than 1 keV with high efficiency in the evaporated gold top layer, thermalizes the absorbed energy rapidly, and conducts heat to the temperature sensing part of a microcalorimeter via the electroplated support stems.

APPLICATIONS

The technology has several potential applications:

- Microcalorimeters
- Biotech research
- Discovery and development of small molecule drugs, biotherapeutics and vaccines

PUBLICATIONS

Patent No: 10074764

More Information

National Aeronautics and Space Administration

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NP-2016-11-2246-HQ

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GSC-16910-1
GSC-TOPS-152