LICENSING OPPORTUNITY: SUPERCONDUCTING MULTI-LAYER TRANSITION-EDGE SENSOR AND HYBRID SUBTRACTIVE-ADDITIVE PRODUCTION OF A SUPERCONDUCTING MULTI-LAYER TRANSITION-EDGE SENSOR

DESCRIPTION

Problem

Currently, superconducting bilayers are patterned using an additive approach during deposition or with subtractive approaches after deposition. Subtractive methods are difficult with noble metals frequently used in superconducting bilayers. In both of the current approaches, additional steps may be required to eliminate superconducting shorts on the edge of the device.

Invention

A method of producing a superconducting multi-layer transition sensor in which the first layer of the multilayer is deposited and patterned completely with a subtractive process before the subsequent layers are deposited and patterned using separate additive processes.

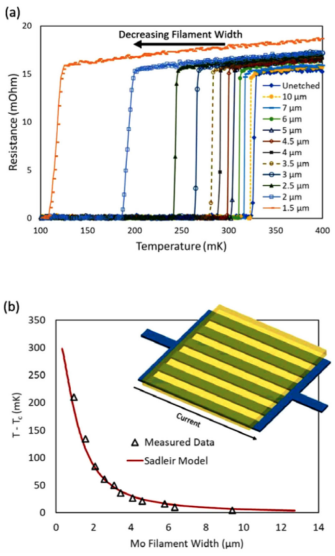
BENEFITS

Commercial Application

X-ray and Gamma-ray spectrometers based on the Transition Edge Sensor (TES) offer a unique combination of high resolution and high efficiency. This patent offers a potentially simpler approach to the micro-fabrication of TES which may be valuable to the commercialization of such spectrometers.

Competitive Advantage

- Increased flexibility for the fabrication process.
- The deposition method for each layer can be chosen separately.
- The gold layer may be patterned additively during deposition through a “lift-off” mask.
- There is no limit to the number of additional liftoff layers.
- Filament process allows for lithographic control of superconducting transition temperature.



One aspect of the Hybrid Subtractive-additive Production of a Superconducting Multi-layer Transition-edge Sensor is the ability to etch patterns into the superconducting layer that add functionally. (a): Here it is experimentally demonstrated that filament patterns of different width can be used to adjust the superconducting transition temperature. (b): The transition temperature as a function of filament width is well described by modeling. This additionally adds to the viability of the approach.

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