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Protein Impregnated Polymer Film Infrared Sensor Using Suspended Microelectromechanical Systems Pixels

By Tetsuo Kaieda

Biblioscholar Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x9 mm. This item is printed on demand - Print on Demand Neuware - The Air Force Research Laboratory Materials and Manufacturing Directorate have developed a novel protein impregnated polymer (PIP) suspension that changes resistivity as a function of absorbed infrared radiation. Due to this property, the PIP is a potential material for use as an uncooled bolometer, or thermal sensor. In this research, a thermally-isolated pixel design, sensor characterization methods, and sensor fabrication and processing steps were developed. To create a microbolometer, the PIP was applied to two prototype micro-electro-mechanical systems (MEMS) surface micro-machined structures. The first is a raised cantilever pixel array that uses residual stress polysilicon and metal film arms to bend the pixels away from their substrate. The second is a suspended membrane pixel array in which the backside silicon wafer substrate is removed. The thermal sensor's figures of merit responsivity, detectivity, noise equivalent power, noise equivalent temperature difference, and thermal time constant, were modeled. An attempt was made to evaluate the performance of the fabricated microbolometer pixels by comparing measured data to model predictions. This research shows the PIP material can be used to make a practical...

Reviews

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