

NASA TECH BRIEF



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Thin Film Thermal Detector

During investigations with thin dielectric films, it was discovered that an abnormally large variation of capacitance with temperature can be obtained in thin film capacitors when a fixed ionic space charge is present in sufficient density in the dielectric film. This effect was made the basis for a new kind of thin film thermal detector, whose performance at room temperature equals or exceeds that of comparable devices at much lower temperatures. The large temperature response (approximately 100 millivolts/ $^{\circ}$ C), the low noise, and a structure that takes advantage of the thin film geometry to minimize thermal losses make possible a detectivity (figure of merit) for the device that approaches the theoretical maximum value at 300 $^{\circ}$ K. The first experimental devices have detectivities falling within one order of magnitude of the limiting value and response times of approximately 50 milliseconds. The new thermal detector offers significant advantages as a temperature sensor in

systems that use digital means for data handling and control. Present investigations are directed toward methods of optimizing the structure of the device and forming arrays that could be used in infrared imaging systems.

Note:

Inquiries concerning this device may be directed to:
Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B67-10505

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Dr. Joseph Maserjian
(JPL-943)

Category 01