

Multiphysics and Simulation of MEMS Based Bolometer for Detecting the Radiations in Nuclear Power Plants

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Abstract

High performance micro sensors are important to detecting special nuclear materials radiations in different fields to save the globe. This paper is mainly focused on to develop a MEMS based bolometer for detecting the nuclear radiation to provide the high security in Nuclear power Plants. A thermally sensitive micro metal plate is designed and placed on a substrate through micro thermal link. The material selected for thermal link provides mechanical support, thermally conducting path, and an electrically conducting path. The energy of the incident radiation is converted into heat in the micro plate and transferred to the substrate through the thermal link. The temperature rise is subsequently sensed and it is directly proportional to the incident nuclear radiations. The materials used to design the micro plate and micro thermal links has given satisfied results over conventional detectors. It can be also used for detecting hazardous radiation from Base Transceiver Stations. The micro plate and micro thermal links are designed and simulated using the Heat transfer and Structural Mechanics physics in COMSOL Multiphysics 4.2.