Design of a MEMS Bolometer with Absorptive Element As Piezo-Protein

H. Sinha[1], A. Mukherjee[1], M. S. Ganesh[1], A. Pasumarthy[1]

[1]Birla Institute of Technology Mesra, Ranchi, Jharkhand, India

Abstract

INTRODUCTION: Bolometer is a device for measuring the intensity of nuclear radiation via the heating of a material due to the ionizing radiations. A bolometer consists of an absorptive element, a thin layered material, connected to a thermal reservoir (a body of constant temperature). The result is that any radiation received on the absorptive element raises its temperature above that of the reservoir: the greater the absorbed power, the higher the temperature. This paper presents a design of the said bolometer with absorptive element as a biologically sensitive material: Piezo-Protein.
USE of COMSO Multiphysics® software: The structure was simulated using COMSOL Multiphysics® software. It involves mainly three coupled physics solid mechanics, heat transfer and Electrostatics with Piezoelectric coupling. Material properties are in accordance with the requisite objective. The incident radiation increases the temperature of the surface which causes the deflection of the structure.
RESULT & CONCLUSION: The proposed design is expected to be more efficient because of the direct transduction technique using the piezo-protein used. The displacement obtained can directly be transduced to voltage.

Reference

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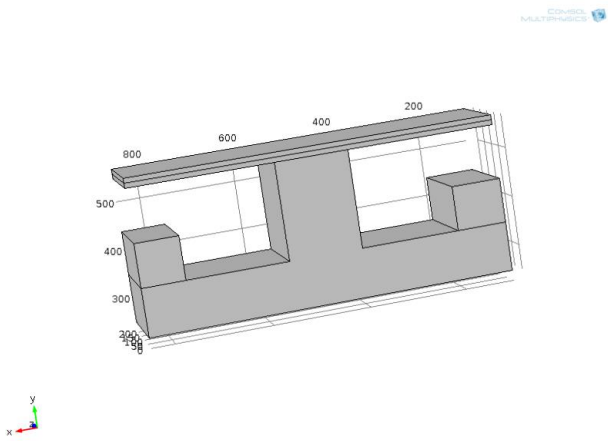
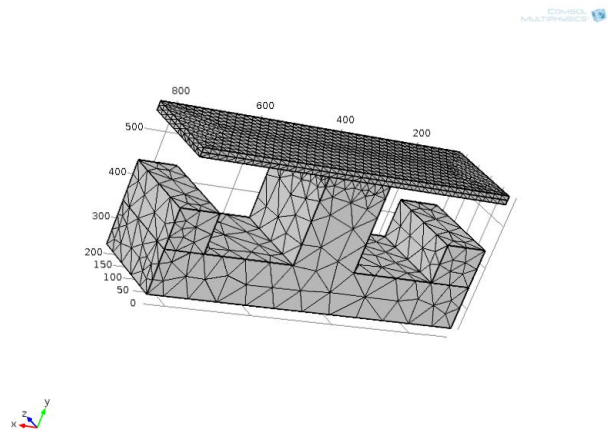# Figures used in the abstract

Figure 1: Structure of the bolometer.
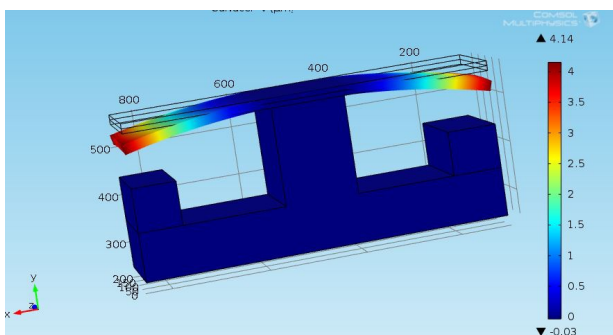

Figure 2: Finite element analysis.

Figure 3: Deflection.