

High-performance piezoelectric thick film based energy harvesting micro-generators for MEMS

Tomasz Zawada¹, Karsten Hansen¹, Rasmus Lou-Moeller¹, Erling Ringgaard¹
Thomas Pedersen² and Erik V. Thomsen²

¹ MEGGITT A/S, Ferroperm Piezoceramics, Hejreskovvej 18A, Kvistgaard, 3490, Denmark

² Department of Micro- and Nanotechnology – DTU, Kgs. Lyngby, 2800, Denmark

Key words: Piezoelectric, PZT, thick film, energy harvesting, MEMS

ABSTRACT

Energy harvesting, known also as energy scavenging, covers a great body of technologies and devices that transform low grade energy sources such as solar energy, environmental vibrations, thermal energy, human motion into usable electrical energy. In this paper vibrations are used as energy source and are transformed by the energy harvesting micro-generator into usable electrical signal. The micro-generator comprises a silicon cantilever with integrated InSensor® TF2100 PZT thick film deposited using screen-printing. The output power versus frequency and electrical load has been investigated. Furthermore, devices based on modified, pressure treated thick film materials have been tested and compared with the commercial InSensor® TF2100 PZT thick films. It has been found that the structures based on the pressure treated materials exhibit superior properties in terms of energy output.