# Two-dimensional and thin-film active layers for magnetic field detection in extreme temperature range

S. El-Ahmar[1], P. Czaja[1], W. Reddig[1], M. Przychodnia[1], J. Raczyński[1], W. Koczorowski[1]

[1] *Institute of Physics, Poznan University of Technology, Piotrowo 3, 61-138 Poznan, Poland*

semir.el-ahmar@put.poznan.pl

Detecting magnetic fields can serve as a means of measuring various quantities like position, movement, direction, and rotational speed. This makes magnetic field detection devices highly useful in many industries. Today, electronics that can function dependably in harsh environments are in high demand, including those that can withstand extreme temperatures. Traditional electronics design often requires active or passive cooling, but this may not always be practical or effective. As a result, there is a growing need for extreme environment electronics, particularly in the automotive, space, defense, and energy industries [1].

Our research explores the potential of utilizing modern two-dimensional material, epitaxial graphene on SiC [2] and classic semiconductor thin-film material (n-InSb) [3] as active layers for sensor structures that can measure magnetic fields from cryogenic temperatures up to 350 °C. Using the developed procedures for temperature testing of the manufactured systems, with simultaneous, cyclical measurement of the Hall effect, we can assess the temperature resistance of the tested systems both in terms of thermal and long-term stability. The conducted research on the active layer and the structure of the sensor is supplemented with temperature tests of the construction materials of the housing of the future device.

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