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Autonomous Battery-Less Wireless Strain Gauge for Structural Health Monitoring

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Strain and temperature are important measurements for structural health and integrity. High magnitude and repetitive variations of these two parameters may lead to fatigue or yielding in the material or even failure of the structure. Strains can be used to estimate the loads, moments, and stresses on structures, or to measure torque, pressure, and acceleration.

Since the surface acoustic wave (SAW) devices are sensitive to various physical parameters, including strain and temperature, they can be used as sensors of these parameters. They are passive (no power supplies (e.g. batteries) are required), they are very small (1 to 3 mm²), they can embed an identification code so that multiple sensors can be used simultaneously within the reading range of the interrogator and they can be used in extreme environments (e.g. temperatures from cryogenic values up to more than 1,000°C).

SAW devices are also well suited for wireless communication. A wireless sensor system consists of SAW sensors/transponders and a radar like interrogator reader. In order for SAW sensors to become ubiquitous, several problems have to be solved. The major challenge is to separate the influence of different physical parameters on the sensor response. The second challenge is to make the sensors operate over a wide temperature range. Both problems have been solved by Albido.

Ключевые слова:

Содержание.

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