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Polymer Composites with Nanoscale Additives for Strain Gauge Applications: a Brief Review

A.V. Shchegolkov[1], V.V. Kaminskii[2], M.A. Chumak[3], D.A. Kalganov[2,3], A.V. Shchegolkov[4]

[1] Institute of Power Engineering, Instrumentation and Radioelectronics, Tambov State Technical University, Sovetskaya str., 106, Tambov 392000, Russia
[2] Institute of Advanced Data Transfer Systems, ITMO University, Kronverkskiy pr., 49, lit. A, St. Petersburg, 197101, Russia
[3] Ioffe Institute, Politekhnicheskaya, 26, St. Petersburg, 194021, Russia
[4] Moscow Polytechnic University, Bolshaya Semyonovskaya str., 38, Moscow, 107023, Russia

Received: October 30, 2024 Corresponding author: V.V. Kaminskii

Abstract. The article discusses various types of polymer composites with nanomaterials that are intended for strain measurement tasks. Despite the obvious advantages of strain gauges based on polymers modified with dispersed conductive structures, there are problems in creating effective ones that can operate under large deformations with high sensitivity and measurement accuracy. This can be realized by implementation of the strain gauge self-compensation effect when combining a semiconductor material (with negative temperature coefficient of resistance) with high calibration coefficient and metal (with positive temperature coefficient of resistance) as well as improved lifetime characteristics allowing for long-term operation with multiple compression/decompression modes. Carbon nanotubes play an important role in the technologies to create polymer composites for strain measurement tasks. It is also possible to change the properties of such composites by varying the type of polymer matrix. This paper analyzes various designs of strain gauges, as well as methods of calculation and modeling of their performances.

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