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Investigation of strain measurement on paper-based strain sensor using carbon electrical conductive paint

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Abstract

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Abstract

Electrical strain gauge has been used widely in many applications, such as experimental strength of materials and structural health monitoring because of their low cost and durability in making measurements. Recently, a few new sensors have been developed using the constantan alloy to enhance the sensor's response and sensitivity. However, researchers have noticed that electrical conductive paints alternate their electrical resistance when subjected tomechanical strain. This conductivity is given by the conductive network created by the conductive particles in the paint mixture. The conductive network is then altered as a result of the mechanical deformation, changing

the material's electrical properties. This research aims to study the effect of the paper-based strain sensor when the carbon electrical conductive paint is used as a sensor coil in the sensor. We studied the changes in the electrical resistance R as the length of the sensor changed according to the applied strain. The conductive paint was applied on 80gsm A4 printing paper. There are three sensor designs that have been studied. For the first method, the gauge factor for design one is 0.67, the second design gives 0.33 for the gauge factor, and the gauge factor for the third design is 0.50. The design that is suitable for the fabrication of the paper-based strain sensor is design 1 because it has the highest sensitivity compared to other designs. However, the sensor's sensitivity must be enhanced by doing more research to produce a better sensor. © 2023 Author(s).

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