

## Research on Sensing Performance of Polyimide-Based Composite Materials

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**Abstract :** Composite materials are widely used in the fields of aviation, aerospace, and transportation due to their lightweight and high strength. Functionalization of composite structures is a hot topic in the future development of composite materials. This article proposed a polyimide-resin based composite material with a sensing function. This material can serve as a sensor to achieve deformation monitoring of metal sheets in room temperature environments. In the deformation process of metal sheets, the slope of the linear fitting line for the corresponding material resistance change rate is different in the elastic stage and the plastic strengthening stage. Therefore, the slope of the material resistance change rate can be used to characterize the deformation stage of the metal sheet. In addition, the resistance change rate of the material exhibited a good negative linear relationship with temperature in a high-temperature environment, and the determination coefficient of the linear fitting line for the change rate of material resistance in the range of 520-650°C was 0.99. These results indicate that the material has the potential to be applied in the monitoring of mechanical properties of structural materials and temperature monitoring of high-temperature environments.

**Keywords :** polyimide, composite, sensing, resistance change rate

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