

Study on the Environmental Stability of Functionalized Graphene-Reinforced PEEK Composites for Antistatic Industrial Applications

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As electronic systems expand in vehicles and electric vehicle (EV) technologies advance, static electricity generated by internal components can lead to electronic malfunctions and component damage. Consequently, there is a growing demand for materials with electrostatic dissipative (ESD) properties. Ensuring superior environmental resistance is essential for automotive components to maintain reliability under harsh conditions, such as high temperature, humidity, and chemical exposure.

In this study, functionalized graphene-reinforced PEEK (polyether ether ketone) composites were developed for antistatic automotive applications, based on PEEK's superior mechanical strength, thermal stability, chemical resistance, and electrical insulation.

The fundamental mechanical and electrical properties of the fabricated composites were evaluated. To assess environmental stability, chemical resistance tests were conducted by immersing specimens in various chemical agents for 96 hours. Additionally, accelerated aging tests were performed for 168 hours in a constant temperature and humidity chamber at 85°C and 85% RH.

The comparative analysis of electrical and mechanical properties following each environmental test revealed that the functionalized graphene-reinforced PEEK composites maintained relatively stable characteristics. These results suggest that these composites are highly suitable for antistatic applications in automotive electronic components.

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References

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Figures



Figure 1: Durable Electrostatic Dissipation Performance of Graphene-PEEK Composites for Industrial Applications