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Dielectrics in Transportation: Shielding Effectiveness against Electromagnetic Interference (EMI) for Metal-Coated Polymer Dielectrics

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Abstract – Lightweight dielectric materials, such as polymers and composites, are increasingly used in the automotive and aerospace industries. Recently, there has been an increase in the use of these dielectric materials, especially in electric vehicles. However, these materials cannot shield sensitive electronics from electromagnetic interference (EMI).

The current work investigates the EMI performance of these lightweight dielectric materials using an experimental setup based on the ASTM D4935-99 standard and EMI simulation using the ANSYS HFSS. This work studies how metal coating from zinc and aluminum bronze can improve the shielding performance of polymer-based dielectrics, such as polyphenylene sulfide (PPS), polyetheretherketone (PEEK), and polyphthalamide (PPA).

Based on the findings of this study, a thin coating (50 μm) of Zn on the surface of PPS and a thin coating of 5 μm and 10 μm of Al-Bronze, respectively, on the surface of PEEK and PPA have indicated an increase in the shielding effectiveness (SE) when subjected to EMI.

The shielding effectiveness significantly increased from 7 dB for the uncoated polymer to approximately 40 dB at low frequencies and up to approximately 60 dB at high frequencies for coated polymers. Finally, various approaches are recommended for improving the SE of polymeric materials under the influence of EMI.

Short Biography - Dr. Huseyin R. Hiziroglu is a Life Senior Member of IEEE and Professor of Electrical Engineering at Kettering University, USA. He joined the former General Motors Institute as an Assistant Professor in 1982 and was promoted to Professor in 1991. His expertise includes dielectric materials, electromagnetic fields, high-voltage systems, electric machines, and energy systems.

Detail: https://web.itu.edu.tr/kalenderli/Huseyin_R_Hiziroglu-29Temmuz2026.htm