



GEMIS

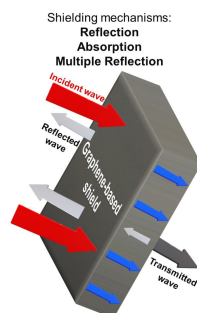
Graphene-enhanced Electro-Magnetic Interference Shielding

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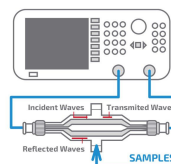
Background

Electromagnetic interference (EMI) is any unwanted natural or human-made EM field that can lead to device malfunctioning and even irreversible damage. Due to the increase in the density of electronic, wireless devices and subsequent EM noise emissions surrounding us, conventional **EMI shielding** materials aren't enough, especially at **high frequencies** [1]. By implementing **graphene(GNP)-based shielding solutions**, the replacement of heavy and expensive metals can be achieved with a lightweight, additive and flexible material.



[1] Wu et al., "Electromagnetic interference shielding effectiveness of composite carbon nanotube macro-film at a high frequency range of 40 GHz to 60 GHz", AIP Advances 5, 067130 (2015)

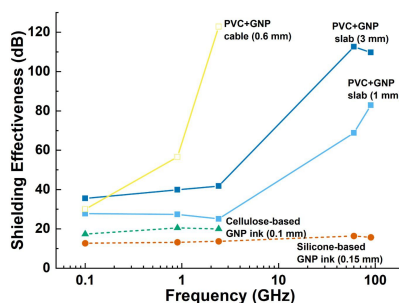
Graphene-based Shielding Solutions



S-Parameters measurements with 2-port VNA (R&S ZNB4).



High conductivity **inks and coatings (150–800 S/m)**, compatible with **screenprinting** and **spray & bladecoating** techniques. Extrudable conductive **PVC compounds (> 150 S/m)**, suitable for automotive industry.



Cable Production



Shielded twisted-pair (STP) cable using a 0.6 mm inner layer of **PVC+GNP** was extruded at Yazaki Saltano (Ovar, Portugal)

Conclusions

Development of several **GNP-based shielding solutions, coatings and compounds**.

Replacement of the conventional metal foil/mesh shields used in cables for an **extruded conductive polymeric layer**.

Validation of graphene as a lighter and more versatile solution than the metal-based alternatives.

Acknowledgements

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