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Development and testing of a new EMI shielding material

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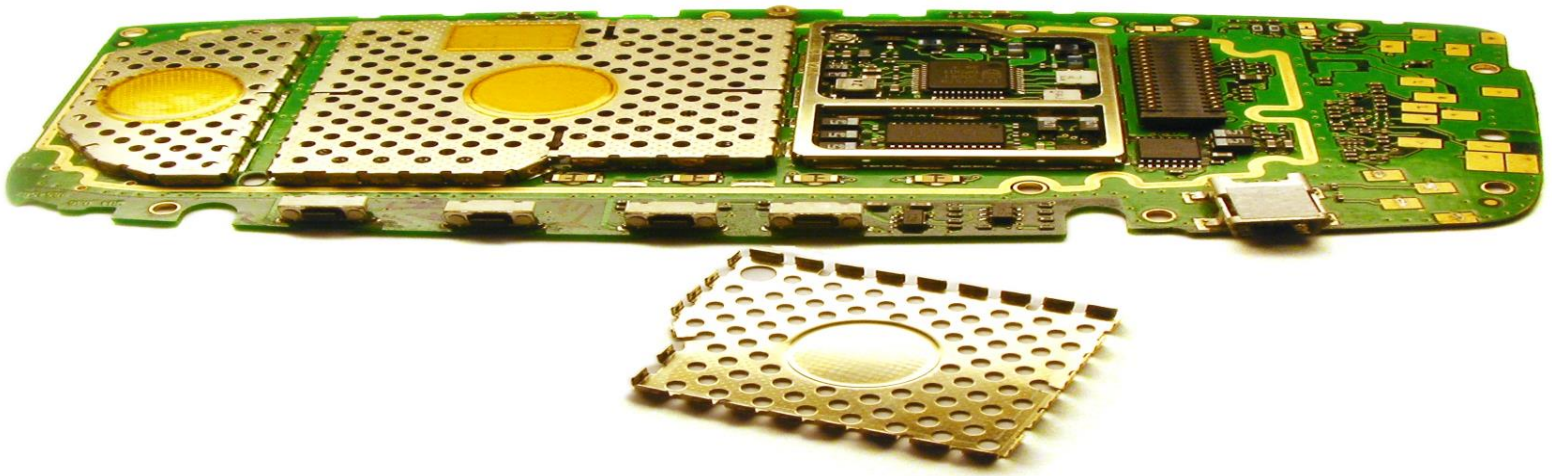
Objectives

- **Introduction**
- **xxxxx**
- **xxxxx**
- **xxxxx**
- **Conclusion**

Introduction

- Electronic devices rely on clear signals. Shielding prevents outside electromagnetic waves from messing with these signals, ensuring devices work properly.



Materials Tested for Electromagnetic Shielding

- Pure Iron powder
- Pure copper powder
- Titanium powder
- Iron (Fe) alloyed with approximately 6.5% silicon (Si).

Materials Tested for Electromagnetic Shielding

- To simplify controlled testing conditions, we utilised a mobile phone enclosed in an aluminium shield, which was specifically modified to include an aperture measuring 5.5mm by 5mm, ensuring precise and standardised exposure to electromagnetic waves during the experimental phase.

Minimum Effective Mass for Shielding

Material Name	Minimum Mass (grams)
Pure Iron powder	8.046
Pure copper powder	2.3
Titanium powder	1.0500
Iron (Fe) alloyed with approximately 6.5% silicon (Si).	1.6

Composite Material Formulation

- The composite materials were formulated by using the most effective materials as determined through our experimentation

Composite Material 1: Copper Powder with Polyester

- By combining copper powder with polyester, we aimed to develop a material that offers both shielding performance and practical applicability.
- The components of Composite 1:
- Copper Powder (2.94g)
- Polyester (8.226g)

Composite Material 2: Titanium Powder with Polyester.

- The creation of this composite enriches the range of shielding materials available for practical applications.
- The components of Composite 1:
- Titanium Powder (3.08g)
- Polyester (9.6647g)

Minimum Effective Mass for Shielding

Material name	The weight for 50*55mm hole (gram)	The weight for 40*40 mm hole with 1mm thickness (gram)	The weight for 40*40 mm hole with 2mm thickness (gram	The weight for 40*40 mm hole with 4mm thickness (gram	The weight for 40*40 mm hole with 5mm thickness (gram
Titanium powder	1.0500	0.6109	1.2229	2.4458	3.0544
Pure copper powder	2.3	1.3382	2.6763	5.3525	6.6906

Results

- **Composite Material 1 vs. Composite Material 2**
- **Composite Material 1 (Copper-Polyester):**

- Electrical Conductivity: The inclusion of copper powder endows Composite 1 with high electrical conductivity, making it exceptionally effective for electromagnetic shielding.
- Ductility and Formability: Copper's mechanical properties contribute to the composite's flexibility and ease of shaping, enhancing its adaptability to various applications.
- **Composite Material 2 (Titanium-Polyester):**

- Lightweight Strength: Titanium's superior strength-to-weight ratio contributes to the lightweight nature of Composite 2, making it advantageous for applications where weight is a critical factor.
- Corrosion Resistance: Titanium's inherent resistance to corrosion adds durability to the composite, potentially extending its lifespan in harsh environments.

Conclusion

- Both composites offer unique advantages, and their potential applications vary based on the distinct mechanical properties of copper and titanium. The selection between the two should be guided by the specific requirements of the intended application.

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Thank you for the kind attention!