

## **Electromagnetic effects of carbon based nanocomposites. Potential applications.**

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### **Abstract**

Carbon based nanomaterials (CBNM) like carbon nanotubes, carbon nanofibers, nanographites and more recently graphenes have been demonstrated as the most useful nanomaterials in terms of performance once added to a matrix like thermoplastic polymers.

Carbon based Nanocomposites offer a big potential for many properties, but mainly the interaction of these nanomaterials with the electric and electromagnetic fields. In this way, important effects have been reported, implying potential developments and applications in aeronautic, defense, and space technologies.

Nanomaterials by themselves cannot fulfil the expectations of their good properties; they need a support, polymers, to be integrated for further transformation in useful items, plastic parts.

Melt compounding or other mixing techniques allows incorporating these new materials within plastics and dispersion is the key point, if we are not able to disperse properly these nanomaterials it will be impossible to reach these properties in the final products.

Plastics and its processing methods such as multilayer film die cast, co-injection or bi-injection moulding allow maximizing and economizing the effectiveness of nanomaterials.

Therefore a holistic point of view of the challenge could give us the solution, nanomaterial plus plastic plus adequate processing method equals to desired performance.

The interaction of carbon based nanocomposites with electric and electromagnetic fields give us important physical phenomena. The high levels of conductivity and absorption are responsible of sensing, piezoelectric effects [1,2], EMI shielding [3], i.e.: shielding of drones and weight reduction, heating processes based on Joule effect or microwave absorption [4], i.e.: avoid accumulation of ice in airplane wings. And, in general, absorption of low and high energy from electromagnetic spectra, such as, radio wave for stealth devices, outstanding x-ray shielding effects [5], for safety and protection requirements, and others. In definitive, this work will summarize the electromagnetic effects of carbon based nanocomposites and the potential applications for security and defense purposes.

### **References**

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