Graphene-based materials boost for application of multifunctional polymers in automotive

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The car represents one of the fastest evolving technological product and today it is an extremely complex object assembled with more than 15000 parts, exceptionally reliable and optimized in terms of safety and environmental impact, with the lowest cost per kilogram respect to other high technological level consumer goods. Future trends for interiors, body and engine systems are the continuous integration of functionalities in order to realize lightweight and perceived quality components always looking at low environmental impact.
The transportation sector is responsible of nearly one-third of global energy demand being the major source of pollution and greenhouse gas emissions in urban areas which opens the room for energy saving opportunities and clean technologies. The environmental sustainability represents one of the major driving forces for the innovation considering European Commission's regulation for CO2 emissions which sets stringent values for fuel economy depending on the average fleet weight (95g CO2/km in 2020 and in 2025 75g CO2/km). The most promising way to enhance operating efficiency is the use of lighter structural and semi-structural materials including polymer-based materials as glass fibers and carbon fibers reinforced plastic (GFRP, CFRP).
Moreover the continuous increasing of customer demands in terms of personalization and high perceived quality of interiors and exteriors requires the development of high performances multifunctional polymers.
As a consequence, considerable materials science effort and new discovery need to be developed to overcome these hurdles. Graphene-based materials with its interesting properties in terms of tensile strength and elastic modulus, electrical and thermal conductivity, thermal stability, gas barrier, and flame retardance are expected to boost the application in automotive sectors contributing significantly in designing novel light composites [1] and multifunctional polymers [2].
The present work provides an overview on Graphene-based materials for automotive applications for energy-efficient, safe and multifunctional components overcoming current limitations of performances, costs, manufacturing and handling.
Multifunctional polymers with enhanced mechanical properties, electrically conductive and piezoresistive capabilities for integrated sensing and metal-free wirings will pave the way to a new generation of energy saving vehicles.
As the developed material could be used in several applications, the impact of the research will benefit a wide range of industry.

References

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