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Abstracts

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Fullerenes for Enhanced Performance of Novel Nano-exploited Aircraft Materials

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Fullerene is an allotropic form of carbon having a large spheroidal molecule consisting of a hollow case of sixty or more carbon atoms. In the past decade, this family of super carbonaceous materials is subject of significant research interest for their utilization in an increasing number of applications including energy, transportation, defense, automotive, aerospace, sporting goods, and infrastructure sectors. Carbon nanotubes and graphene are some of the common types of fullerenes. This presentation will look into how a simple chemical manipulation at nano-scale of a superlative chicken wire structure of graphene can be exploited to address major engineering challenges we are now encountering in the development of non-metallic reinforced plastic aircrafts like Airbus A350 and Boeing Dreamliner 787. Substituting metallic accessories, like Expanded Copper Foil (ECF) used for lighting strike protection, with graphene in the wings of carbon fiber reinforced polymer composites aircrafts is currently being extensively researched at industrial scale. This substitution offers good chemical compatibility with the base matrix material (epoxy) and can solve various existing issues. It would also offer other benefits, like in-situ structural health monitoring of aircraft components and improved mechanical properties and structural integrity as well. However, there are several challenges prior to this forthcoming substitution, as being dealt by leading aircraft manufacturers of Europe and USA, which will be discussed in detail.

Reference:

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