Abstract

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Novel paints for composite materials coatings used in electromagnetic shielding applications

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Abstract

The development of materials offering electromagnetic interference (EMI) shielding is of significant consideration, since this can help in expanding the lifetime of devices, electromagnetic compatibility, as well as, protection of biological systems. Conductive paints used widely today in electromagnetic interference (EMI) shielding applications are often based on organic solvents that can rise safety issues due to the subsequent environment problems. This presentation concerns the development of eco-friendly conductive water-based paints for use in EMI shielding applications, work partially published recently by our research team in Nanomaterials journal [2]. Graphene nanoplatelets, polyaniline emeraldine (PANI) doped with poly(styrene sulfonic acid) (PSS) or HCl or HBr and poly(3,4-ethylenedioxythiophene) poly(styrene sulfonic acid) (PEDOT:PSS) in various ratios were employed in a water base for developing the paints. The target was to develop homogeneous water-based paint-like fluid mixtures easily applied onto surfaces using a paint brush, leading in homogeneous, uniform, opaque layers, draying fast in air at room temperature and having quite good electrical conductivity that can offer efficient EMI shielding performance. Paints with optimized properties were found to offer uniform, homogeneous and conductive layers with a thickness of over 500um without deformation and cracking, exhibiting shielding effectiveness up to -60 dBs for electromagnetic radiation in the GHz frequency range. The structural and morphological characteristics of these paints were also studied in details. As found out, increasing number of applied layers results in more compact, homogeneous material with smoother surfaces at microscopic level. Moreover, it was observed that the type of doping of PANI and the number of applied layers can control the structuring of the paints. Further studies regarding the composites properties and their correlation with the EMI shielding effectiveness are ongoing. Funding: This work was funded by the NATO Science for Peace and Security Programme, grant G5477.

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Biography

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