

Water-based piezoresistive conductive polymeric paint containing graphene for electromagnetic and sensor applications.

Priority Number

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Patent Type

Patent for invention.

Ownership

Sapienza University of Rome 100%.

Inventors

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Industrial & Commercial Reference

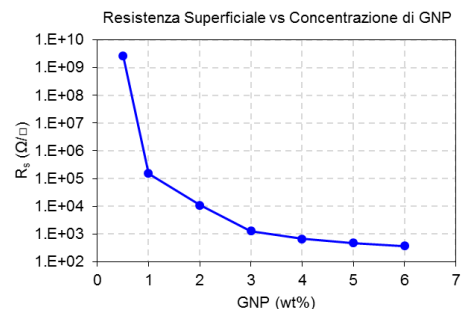
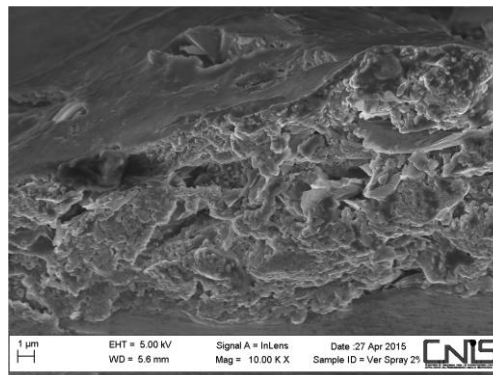
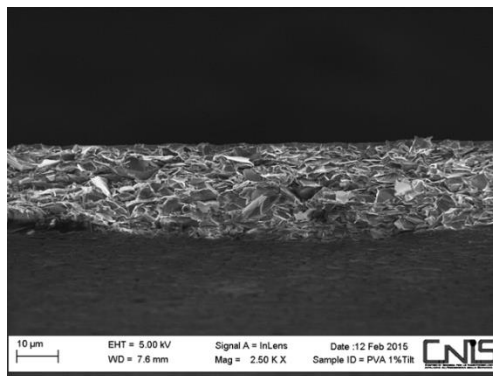
Aerospace, civil and infrastructure sectors for structural health monitoring and non destructive investigation; electromagnetic compatibility and aerospace sectors for low observability and electromagnetic interferences reduction.

Time to Market

Laboratory grade prototypes are available. Technology transfer can be performed in 3-6 months. Industrial prototype production requires 6 months and could be placed on the market after 12 months (this apply to sector where no special certifications are needed).

Availability

Cession, Licensing, Research, Development, Experimentation, Collaboration, Start-up and Spin-off.



Abstract

In this patent the formulation and production of a water based polymeric paint, with controlled electrical, piezoresistive and electromagnetical properties is disclosed.

The paint is produced starting from a commercial available water based paint or rather a water-based liquid polymeric suspension loaded with graphene nanoplatelets (GNP).

The paint can be used for electromagnetic shielding or rather antistatic devices or rather radar absorbing coating or piezoresistive coatings for distributed sensing monitoring of the strain state of a structure.

Publications

- ❖ A. Rinaldi, A. Proietti, A. Tamburrano, M.S. Sarto. "Graphene-Coated Honeycomb for Broadband Lightweight Absorbers". IEEE Transactions on Electromagnetic Compatibility, Volume 60, Issue 5, October 2018, pp. 1454-1462.
- ❖ Rinaldi, A., Tamburrano, A., Sarto, M.S. "Graphene nanoplatelets-based smart textile for kinesthetic monitoring". 2017 Proceedings of IEEE Sensors, 2017-December, pp. 1-3.

KEYWORDS

- ❑ GRAPHENE
- ❑ PAINT
- ❑ SENSOR APPLICATIONS
- ❑ STRUCTURAL HEALTH MONITORING
- ❑ RADAR ABSORBING COATING
- ❑ LOW OBSERVABILITY

AREA

- ❑ NANO-TECHNOLOGIES & MATERIALS

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Water-based piezoresistive conductive polymeric paint containing graphene for electromagnetic and sensor applications.

Technical Description

The process protected by the patent is simple, cost effective and can be easily scaled up to industrial level.

The patent allows the production of water based polymeric paint with controlled electrical, piezoresistive and electromagnetical properties.

These properties are obtained through a meccano-chemical exfoliation of a graphitic precursor and dispersion of graphene nanoplatelets (GNP) inside a commercial available water based polymeric paint.

During the process a water/alcohol mixture is used for both easing the graphite exfoliation and GNP dispersion and controlling product viscosity.

The as produced paint can be deposited through spray coating or other suitable techniques.

Technologies & Advantages

The process protected by the patent is simple, cost effective and can be easily scaled up to industrial level. It allows through the use of a graphitic precursor and a meccano-chemical process carried out inside the paint and a water/alcohol mixture to provide to any water based paint controlled electrical, piezoresistive and electromagnetical properties, without degrading the native paint properties. From a technical point of view, the piezoresistive coatings show high strain sensitivity, whereas lossy coating can greatly reduce the incident EM fields. These coatings have a negligible thickness and weight and can be deposited directly over the desired structure. From a financial point of view, a paint made according to the patent is cost effective and the process is suitable for mass production.

Applications

The piezoresistive properties of the paint are useful for structural health monitoring in aerospace and civil sectors.

The patented process is aimed to produce piezoresistive paint from commercially available water based paint.

The produced coating can be employed on any structure and allows to perform non destructive analysis of the structure through distributed sensing or sensing array.

The paint can be also used to produce radar absorbing coatings, able to protect the structure against electromagnetic interferences such as direct lightning or interaction with EM fields produced by antennas.

These paints can also be used in naval or civil sectors for both structural health monitoring or low observability and electromagnetic interferences reduction.

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