

# Graphene and related materials deposition by spray-gun deposition method. A versatile technique for a large panel of applications.

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## Abstract

Spray-gun deposition method is an extremely versatile method that can be exploited using different materials and substrate. At Thales Research and Technology we have developed a new technique that allows depositing nanomaterials mixtures for different applications. Firstly in 2006, we developed this method to fabricate array of Carbon Nanotubes (CNTs) based transistors for gas sensing applications. We were able to achieve extremely thin layers of percolating CNTs to achieve the transistors channel of Carbon Nanotubes Field Effect Transistors (CNTFETs). In 2012 we started developing this method using mixtures of graphene and CNTs for supercapacitors fabrication. Indeed thanks to this technique we discovered that we were able to achieve nanostructured layers that can allow exploiting at maximum the graphene surface to store more energy but also to define a porous structure particularly effective to improve the power. In 2014 we also thought to implement this technique to deposit large area layer of Graphene Oxide (GO) to fabricate ReRAM, exploiting the migration of oxygen vacancies in the GO layer after applying a bias between a bottom and top contacts. The great advantage of spray in this case is that we can implement the technique by roll-to-roll and therefore achieve large surface on also plastic substrates, reducing dramatically the final price. Recently, we want to implement this technique for Electromagnetic Shielding. Indeed thanks to graphene layer deposited

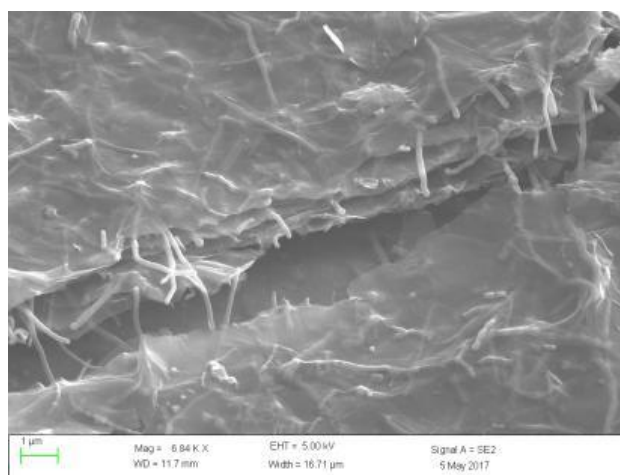
by spray we can achieve multi-layered structures in a quite deterministic way enhancing the absorption to specific frequencies in the X-band.

During the presentation all the different applications and the versatility of this technique will be highlighted .

## References

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## Figures



**Figure 1:** Multi-layered structure obtained intercalating Carbon Nanofibers and Graphene by spray deposition method.