# The graphene oxide-based inkjet technology for flexible electronics

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## Abstract

Flexible electronics is recently attracting increasing interest due to its large potential for application. Among the methods used in the production of flexible electronic devices the inkjet and screen printing are popular as they allow for fast production of thin, conductive tracks on elastic polymer foil and textile surfaces.

Recent research shows that it is possible to produce graphene coatings with the inkjet method. However, currently developed inks and printing techniques, which employ various forms of graphene, are still in research phase and do not allow for commercial production of electrodes and devices. To fully exploit the potential of the graphene for printed, flexible electronics new printing compositions and new overprinting methods need to be developed. The abovementioned challenges are the subject of our current research.

We present the overprints produced in the inkjet technology with graphene oxide dispersion. The graphene oxide ink that we used was developed to be fully compatible with standard industrial printers and polyester (PET) substrates. We describe the post-printing chemical reduction procedure which leads to the restoration of electrical conductivity without destroying the substrate. Our results prove that the proposed method allows to obtain graphene overprints of high optical transparency and low electrical resistivity (from few to hundreds kOhm/sq). The presented results show the outstanding potential of graphene oxide for rapid and cost efficient commercial implementation to production of flexible electronics. Properties of graphene-based electrodes are discussed basing on the macro- and nano-scale characterizations. The observed nano-scale inhomogeneity of the conductivity of the overprints is found to be essential in the field of future industrial applications.

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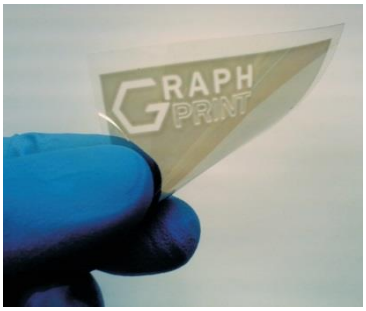
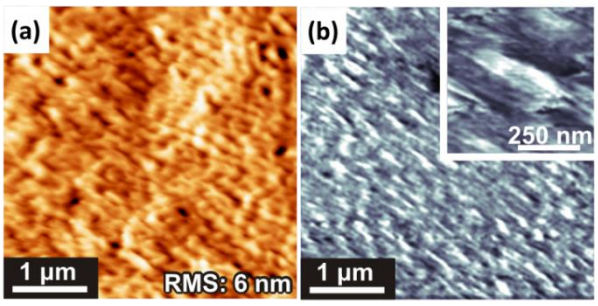
## Figures




**1.** The photo of graphene oxide overprint on PET foil after chemical reduction.




**2.** The atomic force microscopy (a) topography and (b) conductivity images recorded on the surface of the reduced graphene oxide overprints.