

## Technical data sheet: G-Ink

Highly concentrated quality graphene in aqueous solution.

### Description:

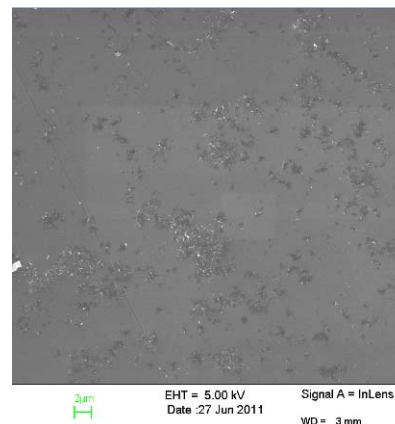
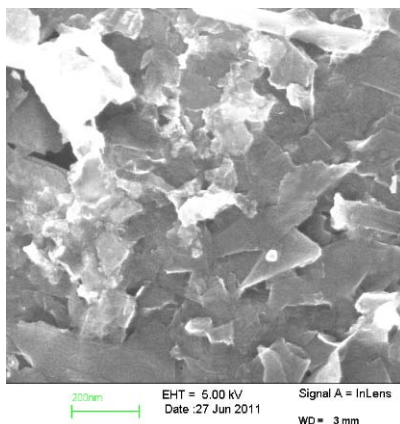
Graphos G-Ink is a highly concentrated suspension of graphene in water with a concentration around 4 mg/ml. The suspended graphene is produced by chemical exfoliation of graphite using a proprietary exfoliating agent.



Graphos G-Ink.

The high quality graphene is produced using a very low amount of exfoliation agent, below 1% wt., yielding graphene flakes with lateral dimensions up to 1 micron.

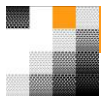
No oxidation processes are involved in the production of Graphos G-Ink, giving to this product the excellent electronic and mechanical properties of graphene.



SEM image of spin coated Graphos G-Ink on silicon.

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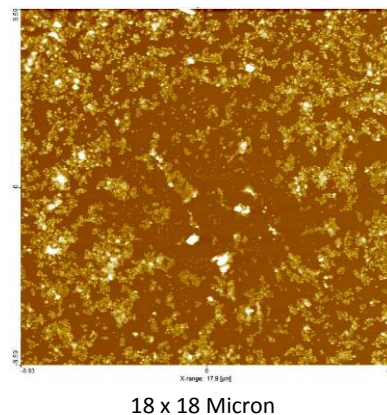
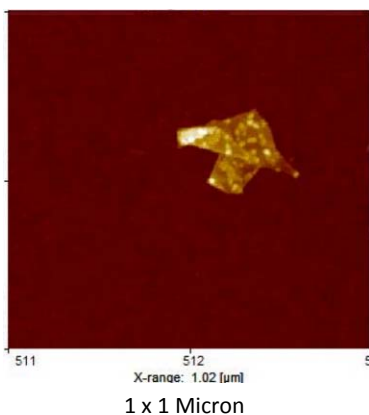
A thin film of Graphos G-Ink can be obtained by filtering, reaching a sheet resistance up to  $70 \Omega/\text{square}$  with thickness lower than 20 micron.

With Graphos G-Ink you can print complex and personalized conductive circuits on standard glossy paper using a common consumer printer.

The printed pattern resistance strongly depends on the working condition: type of printer, type of print head, cartridge cleanness, type of paper, etc. You may need to use multiple printing steps in order to reach low resistivity.

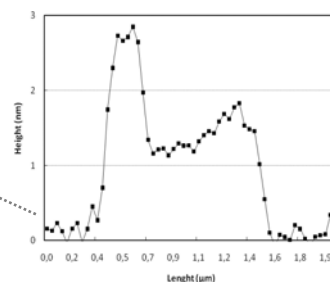
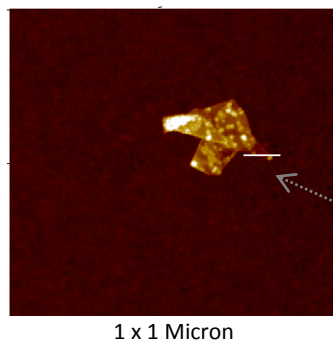
The Graphos G-Ink printed material is stable against mechanical stress, maintaining its high conductivity even upon bending or mild scratching.

AFM images of Graphos G-Ink spin coated on silicon oxide substrate.



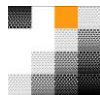
The monolayer thickness measured by AFM is between 1-3 nm as function of the sample preparation methodology.

AFM images and profile of Graphos G-Ink spin coated on silicon oxide substrate



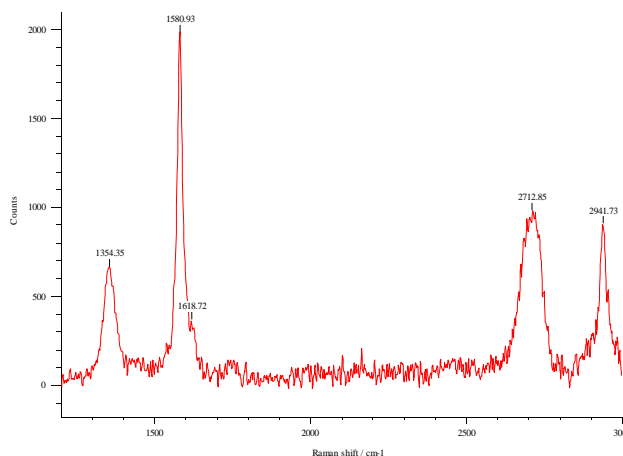
1.2 nm flake thickness height profile

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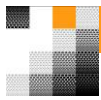
Raman at 514 nm laser (green).



### Main features:

	Value	Method	Note
Monolayers	~65%	AFM	
Bi-layers	~20%	AFM	
Few-layers	~10%	AFM	
Thick flakes	≤5%	AFM	Thickness >20 nm
Average flake lateral dimension	80 nm	AFM	
Sheet resistance:	70 Ω/square	Proprietary	Thickness ~20 μm
Conductivity	~700 S/m	Proprietary	Thickness ~20 μm
pH	Neutral		
Concentration	~4 mg/ml	Gravimetric & spectroscopy	Extinction coefficient $\epsilon=1650 \text{ ml/mg}^* \text{m}$
Exfoliation agent	<1% wt.		

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Is normal to see some reaggregation at the bottom of the sample, this is due to the graphene flakes which tend naturally to restack on graphite structure.

We strongly recommend 30 min sonication before using Graphos G-Ink, please use a suitable filter in case of clogging risk.

Notwithstanding internal tests demonstrate a stable quality after one year storage our suggestion is to use Graphos G-Ink within few months.

This data sheet briefly describes and gives typical data for some of the basic properties of Graphos G-Ink. It is emphasized that all data in this publication have been obtained from laboratory tests on representative samples. Thus, although the values are typical, they are for very general guidance and must not be used as a basis for specifications.

Sample should be stored dry and away from direct sources of heat. More detailed information and advice on individual products may be obtained from the Sales Contacts.

Information contained in this publication, and otherwise supplied to users, are based on our general experience and are given in good faith, but we are unable to accept responsibility in respect of factors which are outside our knowledge or control.

**Is the responsibility of the customer to ensure that the use complies with all relevant regulations. Graphos grade should be use for research purpose.**

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