

GRACE NEWSLETTER

EMPIR | 16NRM01 | GRACE

Latest Highlights

Conferences

- [EMN Meeting on Carbon Nanostructures](#), Rome
- [IEC/TC 113 - GRACE Joint Meeting](#), Madrid
- [Mathematical and Statistical Methods for Metrology workshop](#), Turin

Consortium

Partners:

INRIM, NPL, UoM, CEM, Graphenea, das-Nano, VDE, ISC.

Collaborators:

Politecnico di Torino

Stakeholders:

NIST (US), FORTH (GR), Universidad de Salamanca (SP), Graphene-XT (IT), Hellenic Metrology Institute (GR), Institute of Nanoscience and Nanotechnology "Demokritos" (GR).

Are you a potential GRACE stakeholder? [Join us!](#)



Developing electrical characterisation methods for future graphene electronics

IEC/TC113 - GRACE joint meeting

On May 22 in Madrid at the Universidad Autonoma de Madrid (Instituto de Ciencia de Materiales de Madrid, ICMM) the "GRACE workshop on Good Practice Guides" took place.



The workshop has been hosted within the IEC/TC113 (International Electrotechnical Commission / Technical Committee 113 - Nanotechnology for products and systems) international stakeholders meeting which was regularly scheduled in these days.

The objective of the workshop was to initiate a discussion between the GRACE consortium and its stakeholders. Two Good Practice Guides on the electrical characterization of graphene were presented, dealing respectively with *contact* and *non-contact* methods.

More than 30 people joined the workshop (IEC/TC 113 members, representatives from the Graphene Flagship Standardisation Committee, industry and academia).



Next Events

Save the date: 26 Sept. '19

Graphene Week in Helsinki (Finland).

The GRACE "**industry friendly workshop**" will take place within the Graphene Flagship conference as a parallel session of the conference. The agenda will include the presentation of the two Good Practice Guides on contact and non-contact methods for the electrical characterisation of graphene.

The GRACE Project

The **GRACE project**, now at month 27 of its span, is making possible accurate and reproducible electrical characterisation methods suitable for graphene, both as test samples and in production lines developing *measurement protocols* and *good practice guides*.

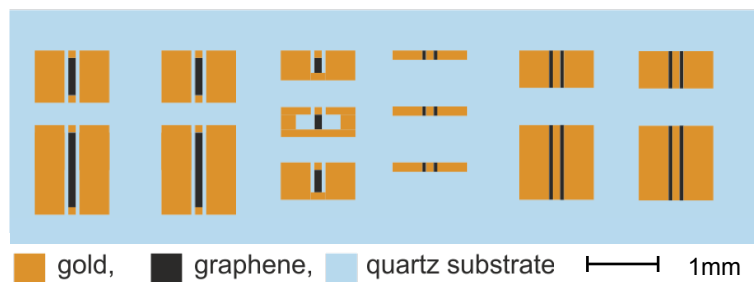
Former Issues

GRACE newsletter n.1

The newsletter has been realised within the Joint Research Project 16NRM01 GRACE: Developing electrical characterisation methods for future graphene electronics. This project has received funding from the EMPIR programme co-financed by the Participating States and from the European Union's Horizon 2020 research and innovation programme.

Project advances

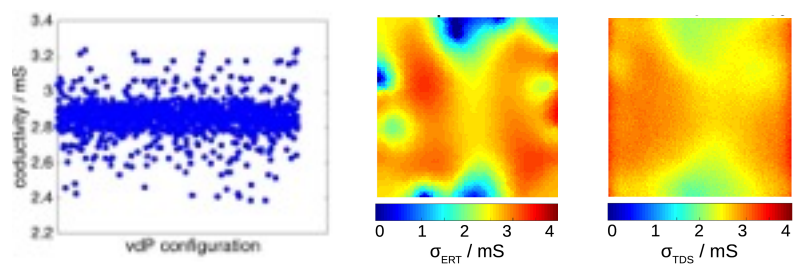
Structures for Co-Planar Waveguide measurements have been fabricated (see the figure below) by the partners from the University of Manchester and Politecnico di Torino. These linear structures will allow to assess the conductivity of CVD graphene by means of radio frequency measurements. The extrapolated results at zero-frequency will be compared with the results of the dc and terahertz techniques.



Project outcome

CVD graphene samples have already been measured with each of these three techniques: van der Pauw method, Time Domain terahertz Spectroscopy and Electrical Resistance Tomography.

The matching between the three methods is very good in terms of average electrical conductivity, over a number of characterised samples.



van der Pauw (different contact configurations), ERT and TDS characterisations of a CVD graphene sample on quartz support. The three methods agree by a few percent in terms of average conductivity.

