

GRACE NEWSLETTER

EMPIR | 16NRM01 | GRACE

Latest Highlights

New Papers

- Scientific Reports [1]

Conferences

- Graphene Week 2019 [2]
- 83 IEC General Meeting [3]

Consortium

Partners:

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

Collaborators:

Politecnico di Torino

Stakeholders:

NIST (US), LNE (FR), 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!



A GRACE researcher during the Graphene Week workshop



Developing electrical characterisation methods for future graphene electronics

First project deliverables done !

Two deliverables of the GRACE project have been submitted to EURAMET. The two documents are (1) the *protocol for the electrical characterisation of graphene using contact methods* and (2) the *protocol for the electrical characterisation of graphene using non-contact and high-throughput methods*. These documents will be the basis for the writing of the two corresponding Good Practice Guides that will be release in mid-2020 by the GRACE consortium.

GRACE "Industry Friendly Workshop" as a joint event of the Graphene Week

On 26 September, during the Graphene Week 2019 in Helsinki, took place the GRACE's Industry Friendly Workshop entitled "GRACE — Methods for the Electrical Characterization of Graphene". The workshop provided an important opportunity to gain step-by-step methodology of characterising graphene's electrical properties. The workshop comes ahead of the publication of two good practice guides, which will be published by the GRACE consortium in 2020. During the GRACE workshop at Graphene Week 2019, standardised and reproducible electrical characterisation methods were outlined in-depth, explaining the possibility of the high throughput of commercial electronics on a mass industrial scale.



| | | | | |
|--|--|---|---|--|
| Thursday 26 September | Plenary Session IV Energy, Magnetism and Spintronics <i>Room Europaea</i> | Registration & Helpdesk | | Poster Session IV Magnetism, energy, environment, filters & composites |
| | | R&D The graphene innovation landscape as reflected in patents <i>Room Fennia I</i> | Parallel I - <i>Room Europaea</i> Device Fabrication & 2D Material Properties | |
| | | Career Development Nature Workshop: How to Increase Publications <i>Room Fennia II</i> | Parallel II - <i>Room Fennia II</i> Physical sensors and Quantum Hall | |
| | | R&D Publishing collaboration for the Graphene Flagship <i>Room Europaea</i> | Parallel III - <i>Room Fennia I</i> Energy Applications, Composites for Mechanical Applications | |
| | | GRACE - Methods for the Electrical Characterization of Graphene - <i>Room Marine</i> | | |
| Challenges and Solutions in Support of Human Space Exploration - <i>Room Nordia</i> | | Exhibition | | |

Programme of the Graphene Week 2019, for the day of the GRACE workshop

The GRACE Project

The **GRACE project**, now at month 28 of its span, is developing accurate and reproducible electrical characterisation methods suitable for graphene, both as test samples and in production lines developing *measurement protocols and good practice guides*.

83rd General Meeting
Shanghai
2019



Past Issues

[GRACE newsletter n.1](#)

[GRACE newsletter n.2](#)

83 IEC general meeting in Shanghai

Among the objectives of the project GRACE, the validated measurement protocols developed by the Consortium are being uptake by IEC to write new technical specifications (normative documents) within the IEC/Technical Committee 113. The *Terahertz time-domain spectroscopy* project is already close to publication as a Technical Specification. The method is now also implemented by the GRACE partner das-Nano in a commercial instrument, granted of a US patent (10.267.836, April 2019). The *four-point probe methods* (4PP and vdP) are at earlier IEC document stages of, respectively, Proposed New Work and Preliminary Work Item. All these documents, emerged from the GRACE project outcome, were discussed at the 83rd general meeting of IEC in Shanghai between 21-25 October 2019. (In the sidebar the logo of the 83 IEC general meeting).

References:

- [1] A. Cultrera *et al.*, "Mapping the conductivity of graphene with Electrical Resistance Tomography," *Scientific Reports*, 9 (1), 10655, 2019. doi: 10.1038/s41598-019-46713-8
- [2] A. Cultrera *et al.*, "Methods for the Electrical Characterization of Graphene", Graphene Week 2019, 26 September 2019, Helsinki, Finland.
- [3] <https://www.iec.ch/meetings/gm/>

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.

