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**H2020-MSCA-RISE-2016-734164 Graphene 3D**
Start date: 01.01.2017 End date:31.12.2020

# Newsletter No. 1

## MULTIFUNCTIONAL GRAPHENE-BASED NANOCOMPOSITES WITH ROBUST ELECTROMAGNETIC AND THERMAL PROPERTIES FOR 3D-PRINTING APPLICATION

**Published in December 2017**

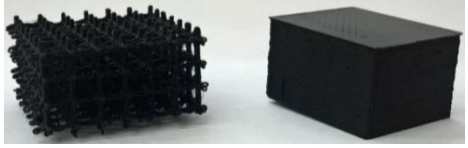
## Project Results

During the first project year, NanoTechLab Ltd. and IPCB-CNR (Pozzuoli) have produced 22 compositions and filaments from PLA with 1.5-12 wt.% graphene and MWCNT, based on Robust design pre-planning (UniSa). Test samples were prepared (at IMech and NanoTechLab Ltd.) and labeled by novel QR Code (at UniSa). The electrical and dielectric properties were fully characterized (UniSa). Data on structure-morphology, SEM/TEM (IPCB, Pozzuoli), Raman spectra (MackGraphe, INP-BSU), electromagnetic properties in GHz and THz regions (INP-BSU), thermal conductivity (SU, UniSa) and surface mechanical properties (IMech) are partly collected. Novel modeling concepts for bi-filler materials and cellular structures were proposed (INP-BSU, UNamur). Novel EG, GO and rGO were synthesized and tested at Narrando.

The first results are optimistic. Our 12 wt.% filament with graphene and MWCNT has twice higher electrical conductivity, while 9 wt.% has comparable conductivity to that of benchmark Black Magic Conductive Graphene/PLA Filament (having 14-16 wt.% filler contents).

The project filament is cheaper than the Black Magic filament, because of the low filler content and the use of commercial graphene nanoplates and MWCNT, supplied from TimesNano, China.

The filament material is printable. Two models of cellular structures are already designed by UNamur and



successfully printed at NanoTechLab Ltd. The properties of cellular structures will be further characterized for proving the modeling concept.

*Continue reading on verso…*

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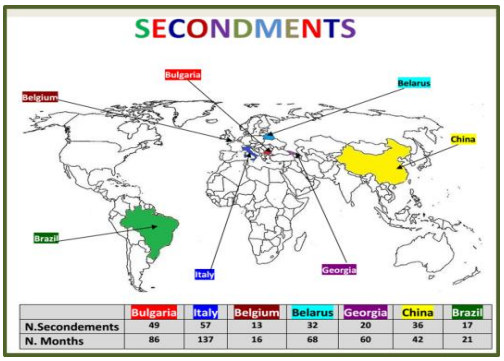
## Progress of secondments:




| | Bulgaria | Italy | Belgium | Belarus | Georgia | China | Brazil |
|---|---|---|---|---|---|---|---|
| N.Secondements | 49 | 57 | 13 | 32 | 20 | 36 | 17 |
| N. Months | 86 | 137 | 16 | 68 | 60 | 42 | 21 |

| Realized in 2017 | Planned to 2018 | Planned for 2019 - 2020 |
|---|---|---|
| 59 | 231 | 199 |

**Number Months for Secondments**

## Dissemination of Project Results in 2017:

Project publications in IF journals: **8**
Open AIRE publications: **5**
Invited talks: **6**
Conference presentations: **4**
Awarded ERs and ESRs on the project topics: **2**
Internal Seminars by Hosts & Seconded researchers: **19**
Seconded Researchers: **8 ESRs** and **25 ERs**

## Public and Society:

Website of Graphene 3D Project is launched and made visible in 6 other Partners' Websites, Google and Research Gate. Eight presentations were given in 2017 on Graphene 3D project objectives and results at larger scientific community in Italy, China, Brazil, Israel, Estonia and Bulgaria. Seventeen Internal Seminars were organized at the Host organizations to monitor the work of the seconded researchers. A press communication about the Graphene 3D project is published in "Academic Press" in Bulgaria.

## Passed Events:

- Kick off meeting at EC, 24-25 January 2017, Brussels
- MB&MC Meeting "6th month Progress Report, WP2 results, and next planning", 17-21 July 2017, Sofia, Bulgaria

## Upcoming Events:

International Workshop on "Nanocomposite polymers for 3D-printing of high-tech structures" will be organized on 22 – 23 May 2018 at UNamur, in Namur, Belgium. About 10 speakers inside and outside of the Consortium and Poster presentations from ERs/ESRs will be invited.
General Assembly meeting and "Mid Term Review meeting with the EC" will take place on 24th and 25th of May 2018 at UNamur, followed by debriefing on 26th May with the Management Board and the GA.

### WP Leaders:

**WP1: Project Management and Coordination**
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**WP3: Characterization of hybrid structure and morphology**
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**WP4: Characterization of nanocomposite properties around percolation threshold**
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**WP5: Robust nanocomposite design and optimization of material's formulation**
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**WP6: Modeling, simulation and optimization of nanocomposite cellular structures**
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**WP7: Prove of design concept by experimental validation of 3D printed cellular structures.**
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**WP8: Dissemination, exploitation of results § communication.**
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**WP9: Ethics requirements**
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