



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



Multifunctional Graphene-based Nanocomposites with Robust Electromagnetic and Thermal Properties for 3D-printing Application

GRAPHENE 3D

H2020-MSCA-RISE-2016 Project, Grant Agreement No. 734164-Graphene 3D, Duration: 01.01.2017 – 31.12.2020

Report on

Workshop on “Polymer Nanocomposites for 3D- printing of Enhanced Porous Structures

October 3-4, 2019 - Centro Polifunzionale Paradiso
of Anacapri, Capri (Italy)

and

MB & CM Meeting

October 3-4, 2019 - Centro Polifunzionale Paradiso
of Anacapri, Capri (Italy)

Authors of the document		
<i>Name/Beneficiary</i>	<i>Position/Title</i>	<i>Date</i>
Giovanna G. BUONOCORE/CNR	Local Organizer	October 14 th 2019
Marino LAVORGNA/CNR	Local Organizer	October 14 th 2019



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



TABLE OF CONTENTS

Introduction	3
Official text according to DoA and given budget	3
Program and Photos	4
List of awards-winners	12
MB & MC Meeting.....	13
Costs	14



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



Introduction

This document is the financial report related to the Workshop on “Polymer Nanocomposites for 3D- printing of Enhanced Porous Structures and of the MB & CM Meeting held, respectively, on October 3th-4th, 2019 and on October 5th, 2019 at Centro Polifunzionale Paradiso of Anacapri, Capri (Italy), performed within the H2020 GRAPHENE 3D project (GA 734164).

The Workshop was organized by CNR partner, it involved about 45 participants. In particular, 2 plenary lectures were delivered by two invited experts in the field of graphene-based nanocomposites and 3D printing applications (Dr. Ian Kinloch from the University of Manchester UK and Dr. Jochen Schmidt from the Friedrich-Alexander-University of Erlangen-Nürnberg, Germany), 2 invited talks delivered by invited speakers from national Research Council and University of Salerno, 1 invited talk delivered by a company (3DnA Srl) working in the field of 3D-Printing, 7 invited talks delivered by ERs of the consortium and 8 talks delivered by ESRs of the consortium, reporting their results within the project. The ESRs took part to a competition for the best 3 oral presentations that have been evaluated by an internal committee.

Official text according to DoA and given budget

The Workshop has been organized in substitution of a Satellite Session dedicated to the Graphane 3D project planned within the frame of an International Nano Conference in month 35. Expenses, with a total cost of 20.354,26 Euro, have been covered by IMech-Bas through the involvement of a company MCM Congress and with the support of the local organizers (CNR-IPCB Partner).



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



Final Program of the Workshop and Photos



**"POLYMER NANOCOMPOSITES FOR 3D-PRINTING
OF ENHANCED POROUS STRUCTURES"**

**GRAPHENE 3D WORKSHOP
CENTRO POLIFUNZIONALE PARADISO
OF ANACAPRI, CAPRI (ITALY)
OCTOBER 3rd- 4th, 2019**





H2020-MSCA-RISE-2016
Grant Agreement No. 734164



“POLYMER NANOCOMPOSITES FOR 3D-PRINTING OF ENHANCED POROUS STRUCTURES”

The “Workshop on Polymer Nanocomposites for 3D-printing of Enhanced Porous Structures” is an event connected with the European Project H2020-MSCA-RISE-2016-734164 Graphene 3D.

“There is a lack of knowledge related to the processing and the development of innovative materials for 3D printing technology. Innovative materials, often realized by exploiting the concepts of nanoparticle and composite, should contribute to improve the properties of the printed objects, while compiling with the printer specifications. Due to many constraints, the designing of these nanocomposites is a challenge that demands intensive theoretical and experimental investigations”.

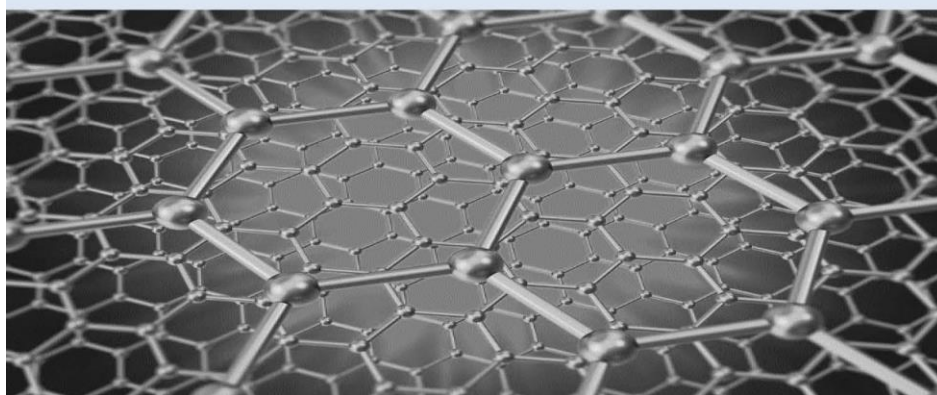
The Workshop contributions will highlight the most interesting results in the field of innovative composite materials as well as will focus on interesting scientific and technological issues concerning the 3D printing technology.

ORGANIZING COMMITTEE

GIOVANNA G. BUONOCORE (PCB-CNR)
RUMIANA KOTSILKOVA, IMECH-BAS
MARINO LAVORGNA, IPCB-CNR
CLARA SILVESTRE, IPCB-CNR

ORGANIZING SECRETARIAT

STEFANIA ACANFORA, MCM CONGRESS
ANNA ESPOSITO, IPCB-CNR
MARIA RISPOLI, IPCB-CNR
ALESSANDRA ALDI, IPCB-CNR





H2020-MSCA-RISE-2016
Grant Agreement No. 734164



WORKSHOP PROGRAM	
THURSDAY, OCTOBER 3 rd 2019	
14.00 – 14.30	REGISTRATION
14.30 – 14.50	OPENING CEREMONY AND WELCOME ADDRESSES <i>LUIGI AMBROSIO (IPCB-CNR Director)</i> <i>RUMIANA KOTSILKOVA (3D Graphene Project Coordinator)</i> <i>CLARA SILVESTRE (IPCB-CNR Responsible in 3D Graphene Project)</i>
1st SESSION	<i>Chairman: Luigi Ambrosio and Rumiana Kotsilkova</i>
14.50 – 15.30	PLENARY LECTURE The Design Rules for Delivering the Promise of 2D Materials in Composites <i>IAN KINLOCH (University of Manchester, UK)</i>
15.30 – 15.50	INVITED LECTURE Simultaneous Realization of Conductive Segregation Network Microstructure and Minimal Surface Porous Macrostructure by SLS 3D Printing <i>HESHENG XIA (Sichuan University, CHINA)</i>
15.50 – 16.10	Tailoring the filler morphology to control the structural and physical properties of HAVOH/MWCNT composites for 3D printing application <i>CHIARA SANTILLO (Institute of Polymers, Composite and Biomaterials CNR, ITALY)</i>
16.10 – 16.40	<i>Coffee Break</i>
2nd SESSION	<i>Chairman: Clara Silvestre and Hesheng Xia</i>
16.40 – 17.00	INVITED LECTURE Medical application for 3D printing: from regeneration to rehabilitation <i>ALFREDO RONCA (Institute of Polymers, Composite and Biomaterials CNR, ITALY)</i>
17.00 – 17.20	Thermoplastics with carbonaceous fillers for Electromagnetic Interference Shielding <i>ANA PAULA GODOY (MackGraphe, Mackenzie Presbyterian University, BRAZIL)</i>
17.20 – 17.40	INVITED LECTURE Preparation and Characterization of FDM 3D-Printed Multi-Functional Polymer/Graphene-Based Nanocomposites and Parts <i>YINGHONG CHEN (Sichuan University, CHINA)</i>
17.40 – 18.00	Terahertz optics of materials with spatially harmonically distributed refractive index <i>DZIMITRY BYCHANOK (Institute for Nuclear Problems of Belarusian State University, BELARUS)</i>
20.00 – 22.30	SOCIAL DINNER @ RESTAURANT "LA ZAGARA"



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



FRIDAY, OCTOBER 4 th 2019	
3rd SESSION	<i>Chairman: Marino Lavorgna and Philippe Lambin</i>
9.45 - 10.25	PLENARY LECTURE Process routes towards novel polymer powders for selective laser sintering <i>JOCHEN SCHMIDT (Institute of Particle Technology, Friedrich Alexander University, GERMANY)</i>
10.25 - 10.45	INVITED LECTURE 3D Printing for Energy Storage <i>CHUHONG ZHANG (Sichuan University, CHINA)</i>
10.45 - 11.05	Preparation and morphological and thermal characterization of PLA/MWCNT/GNP composites for 3D printing <i>ROSA DI MAIO (Institute of Polymers, Composite and Biomaterials CNR, ITALY)</i>
11.05 - 11.30	<i>Coffee Break</i>
4th SESSION	<i>Chairman: Paolo Ciambelli and Yinghong Chen</i>
11.30 - 11.50	INVITED LECTURE 3D printed THz perfect absorbers: 2D vs 3D geometry <i>POLINA KUZHIR (University of Eastern Finland, FINLAND/Institute for Nuclear Problems of Belarusian State University, BELARUS)</i>
11.50 - 12.10	Electromagnetic and thermal properties of Polylactic Acid filled with carbon-based particles for 3D printing applications <i>GIOVANNI SPINELLI (University of Salerno, ITALY)</i>
12.10 - 12.30	Characterization of rheological and mechanical properties of poly(lactic) acid nanocomposites with graphene and carbon nanotubes <i>RADOST IVANOVA (Institute of Mechanics BAS, BULGARIA)</i>
12.30 - 12.50	INVITED LECTURE Thermal conductive properties of 3D-printed cellular structures <i>PHILIPPE LAMBIN (University of Namur, BELGIUM)</i>
13.00 - 14.00	<i>Buffet Lunch</i>
5th SESSION	<i>Chairman: Polina Kuzhir and Giovanna G. Buonocore</i>
14.00 - 14.20	INVITED LECTURE Issues connected to crystallinity in 3D printing <i>ROBERTO PANTANI/SARA LIPAROTI (University of Salerno, ITALY)</i>
14.20 - 14.40	INVITED LECTURE PDMS/rGO nanocomposites: Synthesis, preparation, characterization <i>NATIA JALAGONIA (Iliia Vekua Sukhumi Institute of Physics and Technology, GEORGIA)</i>
14.40 - 15.00	Fabrication of FDM 3D-Printed Polyethylene/Graphene Nanocomposites with Highly Enhanced Thermal Conductivity via Solid-State Shear Milling Technology <i>JINGJING JING (Sichuan University, CHINA)</i>
15.00 - 15.20	INVITED LECTURE Use of Composite Materials for Additive Manufacturing: an industrial perspective <i>ALESSANDRO MANZO/FRANCESCO D. CASCONI (3DnA Srl, ITALY)</i>
15.20 - 15.40	INVITED LECTURE Balancing production and performance in the selection of graphene based filler <i>PAOLO CIAMBELLI (Nanoranda, ITALY)</i>
15.40 - 16.00	High strain sensitivity systems of thermoplastic polyurethane/graphene fabricated with selective laser sintering <i>GENNARO ROLLO (Institute of Polymers, Composite and Biomaterials CNR, ITALY)</i>
16.00 - 16.15	CONCLUDING REMARKS

In the following some pictures taken during the Workshop are reported:



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



Figure 1. Welcome addresses by Dr. Luigi Ambrosio (CNR-IPCB Director) and Dr. Marino Lavorgna (Local Organizing Committee – CNR-IPCB Partner)



H2020-MSCA-RISE-2016
Grant Agreement No. 734164





H2020-MSCA-RISE-2016
Grant Agreement No. 734164



Figure 2. Plenary Lectures of Dr. Ian Kinloch (University of Manchester, UK) and of Dr. Jochen Schmidt (Friedrich-Alexander-University of Erlangen-Nürnberg, Germany)



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



Figure 3. Reception desk and material for participants at Centro Polifunzionale Paradiso of Anacapri



H2020-MSCA-RISE-2016
Grant Agreement No. 734164





Figure 3. Coffee Break and Group Photo on October 4th 2019

List of awards-winners

Title	Presenter	Partner		
TERAHERTZ OPTICS OF MATERIALS WITH SPATIALLY HARMONICALLY DISTRIBUTED REFRACTIVE INDEX	DZIMITRY BYCHANOK	(INSTITUTE FOR NUCLEAR PROBLEMS OF BELARUSIAN STATE UNIVERSITY, BELARUS	1st	Certificate
TAILORING THE FILLER MORPHOLOGY TO CONTROL THE STRUCTURAL AND PHYSICAL PROPERTIES OF HAVOH/MWCNT COMPOSITES FOR 3D PRINTING APPLICATION	CHIARA SANTILLO	CNR-IPCB (ITALY)	2nd	Certificate
FABRICATION OF FDM 3D-PRINTED POLYETHYLENE/GRAPHENE NANOCOMPOSITES WITH HIGHLY ENHANCED THERMAL CONDUCTIVITY VIA SOLID-STATE SHEAR MILLING TECHNOLOGY	JINGJING JING	SICHUAN UNIVERSITY (CHINA)	3rd	Certificate



H2020-MSCA-RISE-2016
Grant Agreement No. 734164





H2020-MSCA-RISE-2016
Grant Agreement No. 734164



MB & CM Meeting

The following participants took part to the MB & CM Meeting held at Centro Centro Polifunzionale Paradiso of Anacapri: Rumiana Kotsilkova (IMECH-BAS, Bulgaria), Marino Lavorgna (CNR, Italy), Philippe Lambin (Unamur, Belgium), Paolo Ciambelli (Narrando, Italy), Patrizia Lamberti (UniSa, Italy), Evgeni Ivanov (NanoTech, Bulgaria), Ekaterina Sanaia (SIPT, Georgia), Polina Kuzhir (INP-BSU, Belarus), Hesheng Xia (Sichuan Univ., China) and Ana-Paula Godoy (MackGraphe, Brazil).

In the following the Agenda of the meeting (Moderators: M. Lavorgna and R. Kotsilkova).

10h00-10h20	General project status: Review on the deliverables, milestones, secondments, dissemination and management – <i>R. Kotsilkova, Project Coordinator (IMech-BAS)</i>
10h20-10h40	Exploitation management and Intellectual Property Rights Agreement <i>E. Ivanov, Exploitation Manager (NanoTechLab)</i>
10h40-10h50	Discussion on the Project status and IPR issue
10h50-12h00	Open discussion on key points of Work Packages with WP Leaders and Partners. <i>M. Lavorgna (WP2), C. Silvestre (WP3), P. Lamberti (WPs 4, 5), Ph. Lambin (WP6), E. Ivanov (WP7), R. Kotsilkova (WPs 1, 8, 9) and All participants</i> Summary information (5 min.) of WP Leaders on implementation, forthcoming deliverables, milestones and identified risks. Discussion with all participants on.
12h00-12h15	<i>Coffee break</i>
12:15 – 12:40	Draft MoU on setting up Graphene/Polymer Joint Research Laboratory for long-term collaboration after the project end (Deliverable D8.5 and Milestone MS4) <i>R. Kotsilkova (IMech-BAS)</i>
12h40-12h50	Organization of the Final Workshop on Graphene 3D project at SIPT, in Tbilisi, Georgia. <i>E. Sanaia (SIPT)</i>
12h50-12h55	Announcements: New Special Issue of Nanomaterials (Open access), <i>G. Spinelli (UniSa)</i>
12h55-13h10	Additional Topics: - Financial Report on the Training school in Salerno, 30 May 2019, <i>P. Lamberti (UniSa)</i> - Changes of the responsible persons proposed from the CNR partner, <i>R. Kotsilkova from the name of C. Silvestre (CNR)</i>
13h10-13h15	Debriefing and closing
13h10-14h30	<i>Lunch</i>



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



All topics have been discussed in detail. A summary is reported in the following:

- *General project status* at month 33 was presented by the Coordinator, R. Kotsilkova (IMech-BAS). She has informed that the planned 10 deliverable reports and 1 milestone for the reporting period were submitted in time. The Work Program is implemented successfully and no deviations from the Annex 1 are observed.

- *Open discussion on the Work Program*. The leaders of the Work Packages have presented briefly the main scientific achievements of their WPs and the forthcoming work that has to be done.

- *The Exploitation plan* was presented by the exploitation manager E. Ivanov (NanoTechLab).

During the second part of the MB meeting the following topics have been discussed:

- *Memorandum of Understanding*. R. Kotsilkova has presented the draft Memorandum of Understanding (MoU) for setting up the Graphene-Polymer Joint Research Laboratory (JRL) for collaboration beyond the funding period of the Graphene 3D project.

- *New Special Issue of Nanomaterials* (an Open access journal), dedicated to 3D printing materials, was announced by the guest editor G. Spinelli (UniSa). He has invited partners to submit joint papers with results from our Graphene 3D project.

- *The Report on the Training school in Salerno*, 30 May 2019, including the financial expenses were presented by P. Lamberti (UniSa).

- *Changes of the responsible persons from CNR in the project consortium*

- *Organization of the Final Workshop in 2020*. E. Sanaia (SIPT) has presented the activities for organization of the Final Workshop on Graphene 3D project at SIPT, in Tbilisi, Georgia. The meeting was fixed for 23-25 September 2020, including a half day for the final MB meeting. The program will be organized several months before the Final Workshop.

After completion of the Agenda, the MB meeting was closed by the project Coordinator, R. Kotsilkova, with acknowledgements to the participants, as well as to the organizers Marino Lavorgna (CNR) and Giovanna Buonocore (CNR).



H2020-MSCA-RISE-2016
Grant Agreement No. 734164



Costs

	Cost	TOTAL
N°3 Coffee Breaks for 40 people	840,00 €	
Light Lunch x 40 people (04/10/2019)	1.000,00 €	
Light Lunch x 20 people (05/10/2019)	500,00 €	
Social Dinner x 40 people (03/10/2019)	2.800,00 €	
Rooms for Invited speaker/Partners in 3 Stars Hotel (28 Rooms x 3 nights) in DUS	7.560,00 €	
Travels from Europe + transports (taxi and jetfoil) for plenary speakers	1.000,00 €	
Rent Room and Technical services Congress Center Anacapri	800,00 €	
Hostess for local assistance	240,00 €	
Fee MCM Agency and Organizing secretariat	3.993,00 €	
TOTAL	18.733,00 € + VAT	20.354,26

In this cost are included also the expenses for the MB/MC meeting of October 5th 2019.
The originals of the MCM Congress invoices have been sent to IMech-Bas financial office.