



## Deliverable

### WP5 – Dissemination and exploitation

#### D5.10 Project literature and posters (2)

##### Project Information

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Name	Position in project	Organisation	Date	Visa
Lucia Petti	Coordinator	CNR	30/06/2022	OK
Giuseppe Nenna	Scientific responsible	ENEA	30/06/2022	OK
Mateusz Wlazło	WP5 Leader	CBRTP	30/06/2022	OK

### Document history

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VF	30/06/2022	Minor revisions	L. Petti (CNR)

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## Executive summary

The Project literature and posters (2) deliverable is related to Task 5.2 of PULSE-COM project and in particular to dissemination activities conducted up to month 31:

- Publications in scientific journals and conferences and workshops;
- Press releases;
- Posters display at conferences, workshops and seminars
- IPR

## Deliverable report

While the first year of the project had been highly impacted by the Covid-19 pandemic and its associated consequences, the continuation of the project is progressively returning to a more normal situation. Hence, it has been possible to attend physically some conferences where some presentations and posters had been presented.

This deliverable is the first update of the deliverable D5.9 - Project literature and posters (1). To facilitate the reading, the information found in the former deliverable are not kept in this one. By consequence, to have the entire vision of the scientific dissemination activities, the two deliverables are needed.

### 1 Publication in scientific journals, conferences and workshops

#### 1.1. Scientific journals

Ought to the good advancement of the project, multiple articles, all in open access, have been produced. From M12 to M31, eight new articles have been produced, including one that is not yet published:

- Katarzyna Gawlińska-Nęcek, Mateusz Wlazło, Robert Socha, Ireneusz Stefaniuk, Łukasz Major, and Piotr Panek, 2021, “[Influence of Conditioning Temperature on Defects in the Double Al<sub>2</sub>O<sub>3</sub>/ZnO Layer Deposited by the ALD Method](#)”, *Materials*, 14(4), 1038.  
<https://doi.org/10.3390/ma14041038>
- Andrés Jenaro Lopez Garcia, Mireille Mouis, Vincent Consonni and Gustavo Ardila, 2021, “[Dimensional Roadmap for Maximizing the Piezoelectrical Response of ZnO Nanowire-Based Transducers: Impact of Growth Method](#)”, *Nanomaterials*, 11(4), 941.  
<https://doi.org/10.3390/nano11040941>
- Andrés Jenaro Lopez Garcia, Giuliano Sico, Maria Montanino, Viktor Defoor, Manojit Pusty, Xavier Mescot, Fausta Loffredo, Fulvia Villani, Giuseppe Nenna, and Gustavo Ardila, 2021, “[Low-Temperature Growth of ZnO Nanowires from Gravure-Printed ZnO Nanoparticle Seed Layers for Flexible Piezoelectric Devices](#)”, *Nanomaterials*, 11(6), 1430.  
<https://doi.org/10.3390/nano11061430>
- Andrés Jenaro Lopez Garcia, Mireille Mouis, Vincent Consonni and Gustavo Ardila, 2021, “[Dimensional Roadmap for Maximizing the Output Piezoresponse of ZnO Nanowire-Based Piezoelectric Transducers: Impact of Growth Method](#)”, *Nanomaterials*, 11(4), 941.  
<https://doi.org/10.3390/nano11040941>
- Domenico Sagnelli, Marcella Calabrese, Olga Kaczmarczyk, Massimo Rippha, Ambra Vestri, Valentina Marchesano, Kristoffer Kortsen, Valentina Cuzzucoli Crucitti, Fulvia Villani, Fausta Loffredo, Carmela Borriello, Giuseppe Nenna, Mariacristina Cocca, Veronica

Ambrogi, Katarzyna Matczyszyn, Francesco Simoni and Lucia Petti, 2021, “Photo-Responsivity Improvement of Photo-Mobile Polymers Actuators Based on a Novel LCs/Azobenzene Copolymer and ZnO Nanoparticles Network”, *Nanomaterials*, 11(12), 3320. <https://doi.org/10.3390/nano11123320>

- Ion Sandu, Claudiu Teodor Fleaca, Florian Dumitrache, Bogdan Alexandru Sava, Iuliana Urzica, Iulia Antohe, Simona Brajnicov, and Marius Dumitru, 2021, “Shaping in the Third Direction; Synthesis of Patterned Colloidal Crystals by Polyester Fabric-Guided Self-Assembly”, *Polymers*, 13(23), 4081, <https://doi.org/10.3390/polym13234081>

- Andrés Jenaro Lopez Garcia, Thomas Jalabert, Manojit Pusty, Viktor Defoor, Xavier Mescot, Maria Montanino, Giuliano Sico, Fausta Loffredo, Fulvia Villani, Giuseppe Nenna, and Gustavo Ardila, 2022, “Size and Semiconducting Effects on the Piezoelectric Performances of ZnO Nanowires Grown onto Gravure-Printed Seed Layers on Flexible Substrates”, *Nanoenergy Adv.*, 2(2), 197-209. <https://doi.org/10.3390/nanoenergyadv2020008>

- Ion Sandu, Claudiu Teodor Fleaca, Florian Dumitrache, Bogdan Alexandru Sava, Iuliana Urzica, Iulia Antohe, Simona Brajnicov and Marius Dumitru, 2022, “Shaping in the Third Direction; Fabrication of Hemispherical Micro-Concavity Array by Using Large Size Polystyrene Spheres as Template for Direct Self-Assembly of Small Size Silica Spheres”, *Polymers*, 14(11), 2158. <https://doi.org/10.3390/polym14112158>

The submitted article but not yet accepted:

- Andrés Jenaro Lopez Garcia, Mireille Mouis, Alessandro Cresti, Ran Tao, Gustavo Ardila, “Influence of slow or fast surface traps on the amplitude and symmetry of the piezoelectric response of semiconducting-nanowire-based transducers”, *Journal of Physics D*, submitted.

## 1.2. Scientific conferences

With the gradual decrease in health constraints, it has been possible for the consortium to attend some conferences where the scientific advancements have been presented.

- [Materials Science & Nanotechnology Conference](#) – 26<sup>th</sup>-28<sup>th</sup> February 2020, Lisbon (Portugal). Domenico Sagnelli has presented for the CNR a presentation on the “Characterization of Novel photomobile polymer formulations for future and smart materials”.

- [CONSILOX XIII](#) – 1<sup>st</sup>-3<sup>rd</sup> October 2021, Alba Iulia (Romania). INFLPR, represented by Bogdan Alexandru Sava, has given a talk in a plenary oral presentation on “Opal-Inverse Opal nanostructures”. The associated abstract, authored by Ion Sandu, Bogdan Alexandru Sava, Lucica Boroica, Ana Violeta Filip, Marius Cătălin Dincă, Claudiu Teodor Fleacă, and Marius Dumitru, is located at p. 98-100.

- [Materials Research Meeting \(MRM2021\)](#) – 13<sup>th</sup>-17<sup>th</sup> December 2021, Yokohama (Japan). UGA, represented by Gustavo Ardila, has been invited to present remotely its work on “Mechanical energy transducers based on semiconducting piezoelectric nanowires”. Authors involved are G. Ardila, A. J. Lopez Garcia, V. Consonni, A. Cresti, G. Ghibaud and M. Mouis.

- [14<sup>th</sup> European Exhibition of Creativity and Innovation](#) – 26<sup>th</sup>-28<sup>th</sup> May 2022, Iasi (Romania). SITEX 45 represented by Dumitru Ulteru and Xavier Vila have presented a work on “Smart optical device for temperature sensing, based on innovative luminescent IV-VI quantum dots-doped complex nanostructured thin films”. This work, performed by M. Elisa, I. C. Vasiliu, S-M. Iordache, A-M. Iordache, I. Pana, C. Elosua Aguado, F. J. Arregui, D. Lopez, D. Ulteru, X. Vila, J. Caridad Hernández, M. Á. Casanova González, J. F. de Paz Santana,

M. Enculescu, A-I. Nicoara and M. Eftimie, had been awarded on a Gold medal (Figure 1).  
Abstract RO. 251, p. 486, [https://www.euroinvent.org/cat/EUROINVENT\\_2022.pdf](https://www.euroinvent.org/cat/EUROINVENT_2022.pdf)



Figure 1: Diploma of Gold Medal attributed to SITES 45 for its presentation at the 14<sup>th</sup> European Exhibition of Creativity and Innovation.

- **NOMA 2022** – 22<sup>nd</sup>-28<sup>th</sup> May 2022, Cetraro (Italy). Domenico Sagnelli has presented for the CNR a presentation on the “Improved responsivity of ZnO-doped LC-photo mobile polymers”.
- **EMRS Spring Meeting 2022, Symposion C: “Semiconductor Nanostructures Towards Opto-Electronic and Photonic Device Applications - VIII”** – 30<sup>th</sup> May-3<sup>rd</sup> June 2022, remote conference. SITES 45 has presented a poster.
- **International Conference on Lasers, Plasma and Radiation-Science and Technology - 7<sup>th</sup> to 10<sup>th</sup> of June 2022** in Bucharest (Romania). INFLPR attended this conference where Bogdan Alexandru Sava has presented a work called “Photo-Mobile-Polymer new functionalities by plasmonic resonance, opal/reverse opal structures and laser polymerization”. It had been produced by Bogdan Alexandru Sava, Rares Victor Medianu, Lucica Boroica, Ana Violeta Filip, Marius Catalin Dinca, Ion Sandu, Bogdan Calin, Marius Dumitru, Antoniu Moldovan, Rovena Pascu, Mihai Oane, and Mihai Eftimie.
- **Global Experts Meet on Condensed Matter Physics** – 16<sup>th</sup>-18<sup>th</sup> of June 2022, Rome (Italy). INFLPR, represented by Bogdan Alexandru Sava, has been invited to present a work on “Ultrathin silver plasmonic films”. This work had been produced by Bogdan Alexandru Sava, Rares Victor Medianu, Ana Violeta Filip, Lucica Boroica, Marius Catalin Dinca, Rovena Pascu, Nicolae Tigau, Andreea Andrei, Antoniu Moldovan, Marius Dumitru, Mihai Oane, and Mihai Eftimie.
- **6<sup>th</sup> International Conference on Nanogenerators and Piezotronics NGPT 2022** – 20<sup>th</sup>-23<sup>rd</sup> of June 2022, Sundsvall (Sweden). UGA has been invited to do a presentation on “The impact of free carriers and surface traps on semiconducting piezoelectric devices”. Implied authors are G. Ardila, A. J. Lopez Garcia, Q. C. Bui, T. Jalabert, M. Pusty, V. Consonni, B. Salem, A. Cresti, G. Ghibaud and M. Mouis.



### 1.3. Scientific workshops

During the second period of the project, the consortium, represented by Giuseppe Nenna (ENEA), Mathieu Thomachot (CTEC), Mateusz Wlazło (CBRTP) and Bogdan Sava (INFLPR) have participated to the EIC bootcamp 3.0. The EIC Innovation Bootcamp is a four-day event, taking place from 23<sup>rd</sup> to 25<sup>th</sup> of May and on 22<sup>nd</sup> of June 2022, and consists of a mix of interactive lectures with group dynamics and hands-on work on business modelling and pitching. Ought to this training, the consortium is better equipped to reach the market.

## 2 Press releases

INFLPR has been highlighted in the journal “[Market Watch](#)” n°239 of November 2021 under the article untitled “Proiectele INFLPR in Orizont 2020” or “INFLPR projects in Horizon 2020” in English. The associated article can be found at pp.16-19 or directly online following this link: [http://www.marketwatch.ro/articol/17514/Proiectele\\_INFLPR\\_in\\_Orizont\\_2020/](http://www.marketwatch.ro/articol/17514/Proiectele_INFLPR_in_Orizont_2020/)

## 3 Posters

The UGA have been involved in the “Journées Nationales du GDR OXYFUN” in Guéthary (France) the 4<sup>th</sup>-8<sup>th</sup> of Avril 2022 to present a poster on “Gravure Printed Seed Layer Mediated Growth of ZnO Nanowires at Low Temperature for Flexible Electronic Applications”. Authors are M. Pusty, A. J. Lopez Garcia, G. Sico, M. Montanino, V. Defoor, X. Mescot, F. Loffredo, F. Villani, T. Jalabert, G. Nenna, and G. Ardila.

The UGA, represented by Andres Jenaro LOPEZ GARCIA, has presented a poster (Figure 2) entitled “A Capacitance study of Nanocomposites integrating Piezo-Semiconductor Nanowires: Experiment and Simulation” to the JNSRE 2021 (French National Days on Energy Harvesting and Storage)– 2<sup>nd</sup> and 3<sup>rd</sup> of June 2021.

UGA has also participated to the 21<sup>st</sup> IEEE International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers) from the 20<sup>th</sup> to the 25<sup>th</sup> of June 2021. It had been the occasion to present a work, using a poster, on “A New Approach to Calculate the Piezoelectric Coefficient of Piezo-Semiconductor Nanowires Integrated in Nanocomposites: Experiment and Simulation”.

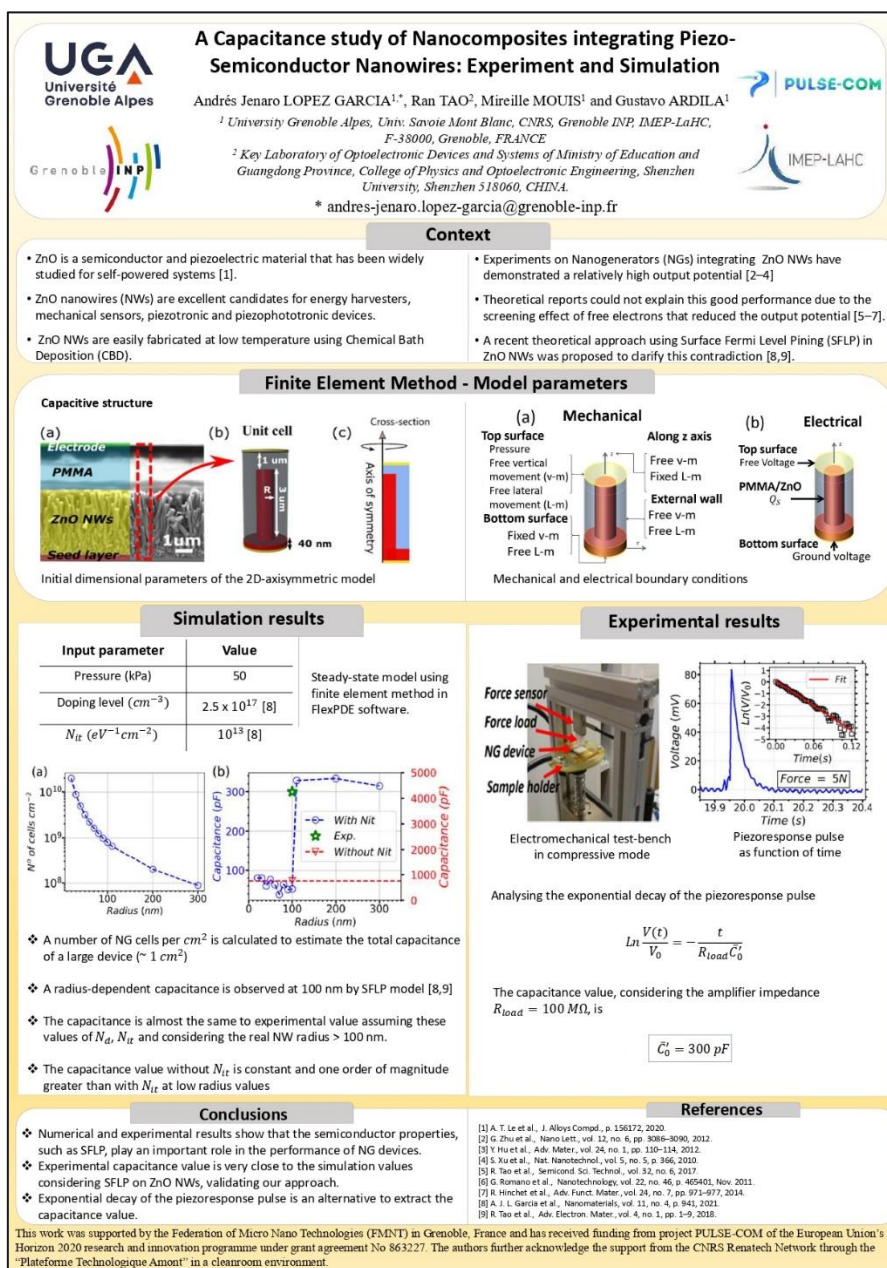


Figure 2: A Capacitance study of Nanocomposites integrating Piezo-Semiconductor Nanowires: Experiment and Simulation.

The CB RTP has presented a poster (Figure 3) entitled "Al<sub>2</sub>O<sub>3</sub> ALD buffer layers for epitaxial growth of boron nitride beyond the self-termination limit" to the AVS 21<sup>st</sup> International Conference on Atomic Layer Deposition (ALD 2021) – 27<sup>th</sup> to 30<sup>th</sup> of June 2021 – Remote. This work had been done by M. Wlazło, G. Kołodziej, P. Michałowski, P. Ciepiewski, P.A. Caban.



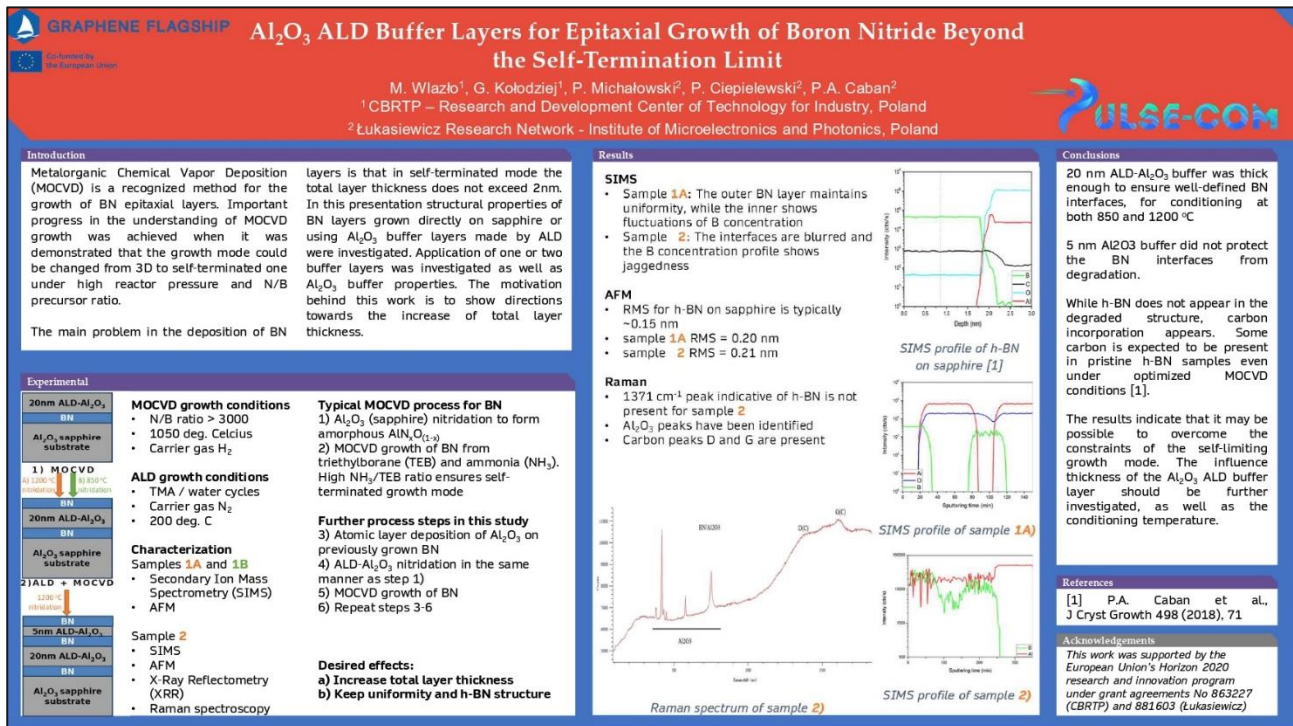


Figure 3: Al<sub>2</sub>O<sub>3</sub> ALD buffer layers for epitaxial growth of boron nitride beyond the self-termination limit.

The UGA has participated to the “Journées Scientifiques du Pôle physique, ingénierie, matériaux” JSPEMED in Grenoble (France) in Octobre 2021. They have presented a poster on the “Assessment of Piezoelectric Coefficient on Piezo-Semiconductor Nanowires Integrated in Nanocomposites: Experiment and Simulation”. This poster included the work from A. J. Lopez Garcia, R. Tao, M. Mouis and G. Ardila.

The same team has also produced two posters for the plenary meeting of GDR NAME in Paris (France) the 4<sup>th</sup>-6<sup>th</sup> of October 2021. The first one is on “ZnO Nanowires Grown at Low Temperature on Gravure Printed ZnO Nanoparticle Seed Layers for Flexible Electronic Applications”, authors are A. J. Lopez Garcia, G. Sico, M. Montanino, V. Defoor, M. Pusty, X. Mescot, F. Loffredo, F. Villani, T. Jalabert, G. Nenna and G. Ardila. The second one is “Role of semiconductor properties in the performance of ZnO nanowires-based transducers” by A. J. Lopez Garcia, M. Pusty, T. Jalabert, R. Tao, A. Cresti, M. Mouis, and G. Ardila.

## 4 IPR

### 4.1. Patents pending

**Dispositivo foto-piezoelettrico** (Photo-piezoelectric device)

**Applicants:** AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE; Italian National Council of Research - CNR; UNIVERSITE GRENOBLE ALPES

**Authors:** Giuseppe Nenna, Riccardo Miscioscia, Giuliano Sico, Maria Montanino, Tommaso Fasolino, Lucia Petti, Domenico Sagnelli, Gustavo Ardila

**Filing date:** N/A

**European patent application number:** N/A

### Photo-piezoelectric generator of electrical energy from light energy

Applicants: Centrum Badan i Rozwoju Technologii dla Przemyslu S.A.; Italian National Council of Research - CNR; AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE; UNIVERSITE GRENOBLE ALPES

Authors: M Haras, T Skotnicki, M Wlazło, G Kołodziej, G Ardila-Rodriguez, L Petti, G Nenna

Filing date: 21<sup>st</sup> September 2021

European patent application number: EP21461595.7

#### 4.2. Accepted patent

For the moment no patent produced within the project has been accepted.