Deliverable

WP5 – Dissemination and exploitation

D5.11 Project literature and posters (3)

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Name	Position in project	Organisation	Date	Visa
Lucia Petti	Coordinator	CNR	29/06/2023	OK
Giuseppe Nenna	Scientific responsible	ENEA	30/06/2023	OK
Jean Herisson	Project management Officer	BENKEI	28/06/2023	OK
Wojciech Andrysiewicz	WP5 Leader	CBRTP	30/06/2023	OK

Document history

Version	Date	Modifications	Authors
V0	23/06/2023	First version	J. Herisson (Benkei)
V1	26/06/2023	Addition of an article produced by INFLPR and transfer of all articles produced for the SPIE conference to the section 1.2.	J. Herisson (Benkei)
V2	28/06/2023	Addition of new entries regarding SITEX 45 actions	J. Herisson (Benkei)
V3	29/06/2023	Addition of new entries regarding CNR actions	J. Herisson (Benkei)
VF	30/06/2023	Small Modifications	G. Nenna (ENEA)

Table of content

Executive summary

The Project literature and posters (3) deliverable is related to Task 5.2 of PULSE-COM project and in particular to dissemination activities conducted during the final year of the project:

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

Deliverable report

This deliverable is the final update of a series of three deliverables started by the D5.9 - Project literature and posters (1) and followed by the D5.10 - Project literature and posters (2). 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 three deliverables are needed.

1 Publication in scientific journals, conferences and workshops

1.1. Scientific journals

From M32 to M43, four new articles have been published in various journals:

- Ana Violeta Filip, Bogdan Alexandru Sava, Rares Victor Medianu, Lucica Boroica, Marius Catalin Dinca, Rovena Pascu, Nicolae Tigau, Andreea Andrei, Antoniu Moldovan, Marius Dumitru, Mihai Oane, Mihai Eftimie, 2022, “Ultrathin films of silver by Magnetron Sputtering”, *Inorganics*, 10, 235, 1-14. https://doi.org/10.3390/inorganics10120235
- Domenico Sagnelli, Massimo Rippa, Amalia D’Avino, Ambra Vestri, Valentina Marchesano, Lucia Petti, 2022, “Development of LCEs with 100% Azobenzene Moieties: Thermo-Mechanical Phenomena and Behaviors”, *Micromachines*, 13, 1665. https://doi.org/10.3390/mi13101665
- Thomas Jalabert, Manojit Pusty, Mireille Mouis and Gustavo Ardila, 2023, “Investigation of the diameter-dependent piezoelectric response of semiconducting ZnO nanowires by Piezoresponse Force Microscopy and FEM simulations”, *Nanotechnology*, 34, 115402. https://doi.org/10.1088/1361-6528/acac35
- Andrés Jenaro Lopez Garcia, Mireille Mouis, Thomas Jalabert, Alessandro Cresti and Gustavo Ardila, 2023, “Length and polarity dependent saturation of the electromechanical response of piezoelectric semiconducting nanowires”, *Journal of Physics D: Applied Physics*, 56, 125304. https://doi.org/ 10.1088/1361-6463/acbc86

Recently a new article has been submitted:

- Domenico Sagnelli,Amalia D'avino, Massimo Rippa, Ambra Vestri, Valentina Marchesano, Giuseppe Nenna, Fulvia Villani, Gustavo Ardila, Sonia Centi, Fulvio Ratto, Lucia Petti, 2023, “Enhancing Quantum Yield in Azobenzene Actuators for Solar Energy Harvesting”, *ACS Applied Materials & Interfaces*, submitted.

1.2. Scientific conferences

The consortium attended seven conferences in which the PULSE-COM scientific advancements have been presented:
- European Optical Society Annual Meeting 2022, 12th-16th September 2022, Porto (Portugal). Francesco Simoni has presented for CNR a presentation on "Heliconical Cholesterics: new opportunities for optofluidics?".
- Electronics for Sustainable Societies – 13th-16th September 2022, Liverpool (UK). Gustavo Ardila has presented for UGA a presentation on the "Semiconducting Piezoelectronic Transducers based on ZnO Nanowires".
- Notte dei Ricercatori, 30th September 2022, Napoli (Italy). Domenico Sagnelli (CNR) presented the PULSE-COM project with some general results and Amalia D'Avino (CNR) presented some more specific results in a poster entitled "Multiwavelength and mechanical improvement in doped azo-PMPs".
- Futuro Remoto, 22nd-27th November 2022, Napoli (Italy). A team coming from both CNR and ENEA (Fausta Loffredo, Giuseppe Nenna, Fulvia Villani, Anna De Girolamo Del Mauro, Tommaso Fasolino, Maria Montanino, Giuliano Sico, Riccardo Miscioscia, Lucia Petti, Domenico sagnelli, Ambra Vestri, Valentina Marchesano, Amalia D'Avino, Massimo Rippa) have presented the PULSE-COM project through experiments (Figure 1).

Figure 1: Some of the CNR/ENEA people involved in the Futuro Remoto event.

- World congress of Nano science and technology - Nano-S&T – 8th-10th February 2023, Sapporo (Japan). Gustavo Ardila has presented for UGA a presentation on the "Nanowire-based piezoelectric transducers: the impact of semiconducting properties".
- SPIE Optics + Optoelectronics, 24th-27th April 2023, Prague (Czech Republic). The whole consortium gathered within this conference. The final event of the project, called "PULSE-COM Workshop" had been organised the 27th within the Smart Materials for Opto-Electronic Applications conference (Figure 2).

Figure 2: PULSE-COM consortium gathered at the SPIE Conference for its final event.

It had been the occasion to produce ten articles to disseminate the results of the project. The complete list is described hereafter:

- Patrick Meneroud, Jolan Gauthier, Sylvain Duc, Mathieu Thomachot, Frank Claeyssen, 2023, "New range of light driven actuation devices", Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 1258407 (2023) https://doi.org/10.1117/12.2665171.
- Amalia D'Avino, Domenico Sagnelli, Ambra Vestri, Massimo Rippa, Valentina Marchesano, Veronica Ambrogi, Anna De Girolamo, Fausta Loffredo, Fulvia Villani, Giuseppe Nenna, Lucia Petti, 2023, "Optimization of PMP films' preparation and mechanical properties using ZnO nanoparticles as dopant", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 1258405 (2023) https://doi.org/10.1117/12.2665616.
- M. Haras, M. Wlazło, W. Andrysiewicz, T. Skotnicki, 2023, "ZnO nanorods as a piezoelectric energy harvester from light induced flexions", Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 1258408 (2023) https://doi.org/10.1117/12.2665540.
- Fulvia Villani, Fausta Loffredo, Giuliano Sico, Maria Montanino, Anna De Girolamo Del Mauro, Maria Federica Caso, Manojit Pusty, Thomas Jalabert, Giuseppe Nenna, Gustavo Ardila, 2023, "Printed ZnO nanoparticle seed layers to grow ZnO nanowires on flexible substrates", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 125840A (2023) https://doi.org/10.1117/12.2666645.
- F. Loffredo, A. De Girolamo Del Mauro, F. Villani, M. F. Caso, T. Fasolino, R. Miscioscia, A. Vestri, D. Sagnelli, A. D'Avino, L. Petti, G. Nenna, 2023, "Photomobile films based on liquid crystal polymer carbon black composites", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 125840J (2023) https://doi.org/10.1117/12.2673120.
- Anna De Girolamo Del Mauro, Fausta Loffredo, Fulvia Villani, Maria Federica Caso, Tommaso Fasolino, Ambra Vestri, Domenico Sagnelli, Amalia D'Avino, Lucia Petti, Giuseppe Nenna, 2023, "Visible photomobile response of azobenzene-based", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 125840B (2023) https://doi.org/10.1117/12.2666618.
- Dumitru Ulieru, Oana-Maria Ulieru, 2023, "The comparative analysis of 2D photonic crystals applications based on specific modeling/simulation results", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 125840C (2023) https://doi.org/10.1117/12.2665488.

- Wojciech Andrysiewicz, Dominik Wojcieszczak, Robert Socha, Domenico Sagnelli, Amalia D'Avino, Lucia Petti, 2023, "Photo-mobile polymer in energy harvesting applications under simulated solar light", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 1258409 (2023) https://doi.org/10.1117/12.2666931.
- Thomas Jalabert, Manojit Pusty, Andrés Jenaro Lopez Garcia, A. Cresti, Mireille Mouis, Gustavo Ardila, 2023, "ZnO nanowires based piezoelectric energy transducers: the role of size and semiconducting properties", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 1258406 (2023) https://doi.org/10.1117/12.2665500.
- Bogdan Alexandru Sava, Ion Sandu, Bogdan Stefanita Calin, Lucica Boroica, Ana Violeta Filip, Marius Cătălin Dincă, Alexandra Maria Isabel Trefilov, Claudiu Teodor Fleacă, Marius Dumitru, Marian Zamfirescu, Dumitru Ulieru, 2023, "Optical effects by opal/reverse opal structures, laser polymerizing and plasmonic Ag ultra-thin films", "Proceedings Volume 12584, Smart Materials for Opto-Electronic Applications; 125840K (2023) https://doi.org/10.1117/12.2682701.

- Materials Research Society Spring Meeting 2023, 25th-27th April 2023, Virtual event. Gustavo Ardila has presented for UGA a presentation on "Probing the Local Piezoelectric Response of Semiconducting ZnO Nanowires by Piezoresponse Force Microscopy and Finite Element Modeling."

Even if the project ends by the end of June 2023, some communication and dissemination actions will take place in the near future. It is for example the case for two joints communications by CNR and ENEA:
- 109th National Congress of the Società Italiana di Fisica (SIF), 11th-15th September 2023, Fisciano (Italy), "Effect of carbon black on the photomobile properties of liquid crystal polymers with or without azobenzene moieties by F. Loffredo, A. De Girolamo Del Mauro, F. Villani, M. F. Caso, T. Fasolino, R. Miscioscia, A.Vestri, D. Sagnelli, A. D'Avino, L. Petti, G. Nenna. And "Optimization of photomobile polymer films' production by ZnO nanoparticles and silver nanocuboids doping by A. D'Avino, D. Sagnelli, A. Vestri, M. Rippa, V. Marchesano, A. De Girolamo Del Mauro, F. Loffredo, F. Villani, G. Nenna, F. Ratto, V. Ambrogi and L. Petti.

Or for a joint communication by SITEX 45 and INFLPR:
- The 46th International Semiconductor Conference CAS an IEEE event, 11th-13th October 2023, Sinaia (Romania), "The spectral analysis instrumentation based on the optical effects generated by hybrid structures on Photomobile Polymer substrate". Authors: Bogdan Alexandru Sava, Dumitru Ulieru, Ion Sandu, Bogdan Stefanita Calin, Oana Maria Ulieru, Lucica Boroica, Ana Violeta Filip, Marius Cătălin Dincă, Alexandra Maria Isabel Trefilov, Claudiu Teodor Fleacă, Marius Dumitru, Marian Zamfirescu.

1.3. Scientific workshops

Thomas Jalabert from UGA has assisted to two workshops:
- Journées nationales des nanofils semiconducteurs, 28th September 2022, Nice (France). Thomas Jalabert made an oral presentation on "Probing the local piezoelectric response of semiconducting ZnO nanowires by Piezoresponse Force Microscopy".
- Forum des microscopies à sonde locale, 3rd-7th April 2023, Obernai (France), Thomas Jalabert made an oral presentation on "The impact of free carriers and surface traps on semiconducting piezoelectric structures and related devices".

1.4. Books

Some of the members of the consortium have been invited to contribute to a book entitled "Optical Materials and Applications: Volume 1 – Novel Optical Materials" edited by Iam Choon Khoo (The Pennsylvania State University, USA), Francesco Simoni (Università Politecnica delle Marche, Italy), and Cesare Umeton (Università della Calabria, Italy) (https://doi.org/10.1142/13523). The authors, D. Sagnelli, A. Vestri, A. D'Avino, M. Rippa, V. Marchesano, F.Ratto, A. De Girolamo Del Mauro, F. Loffredo, F. Villani, G. Nenna, G.Ardila, P. Meneroud, J. Gauthier, S. Duc, M. Thomachot, F. Claeyssen, L.Petti have produce the final chapter on "Novel photosensitive materials for microengineering and energy harvesting".

2 Press releases

No press releases had been produced during that period of the project.

3 Posters

As already introduced in the previous sections, the PULSE-COM partners had the opportunity to make some posters dedicated to various events.

For example, Dumitru Ulieru from SITEX 45 have been involved in the preparation of a poster entitled "Advanced sol-gel IV-VI quantum dots-doped thin films for temperature sensing systems" that has been presented to the 26th International Congress on Glass at Berlin (Germany) from the 3rd to the 8th of July 2022. From the 19th to the 21st of August 2022, Dumitru Ulieru was also involved in another poster with Xavier Vila (from SITEX 45 too) on "Complex sol-gel IV-VI quantum dots-doped inorganic thin films for temperature sensing instrumentation". This poster had been presented at the 24th International Conference Materials, Methods & Technologies in Burgas (Bulgaria).

In September 2022, Amalia D'Avino made on poster for the "Notte dei Ricercatori" (Figure 3).

Also, for the SPIE Conference conducted in Prague in April 2023, two partners of the consortium have presented some posters. The first one, presented by Fausta Loffredo (ENEA) is about the "Photomobile films based on liquid crystal polymer-carbon black composites" (Figure 4). The second one, presented by Bogdan Sava (INFLPR), is about the "Optical effects by opal/reverse opal structures, laser polymerizing and plasmonic Ag ultra-thin films" (Figure 5).

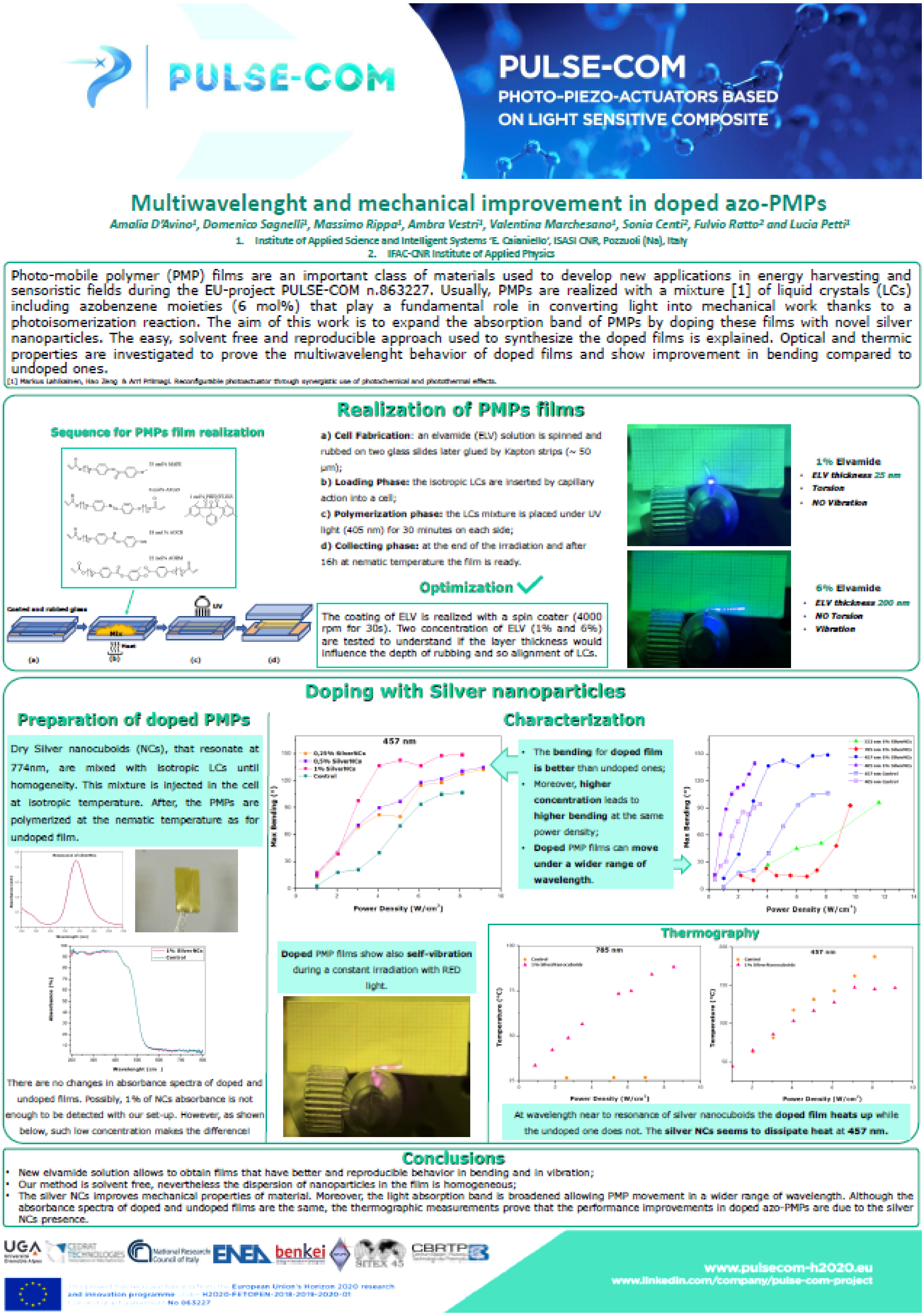

Figure 3: Poster presented by Amalia D'Avino (CNR) for the 'Notte dei Ricercatori' in Napoli (Italy).

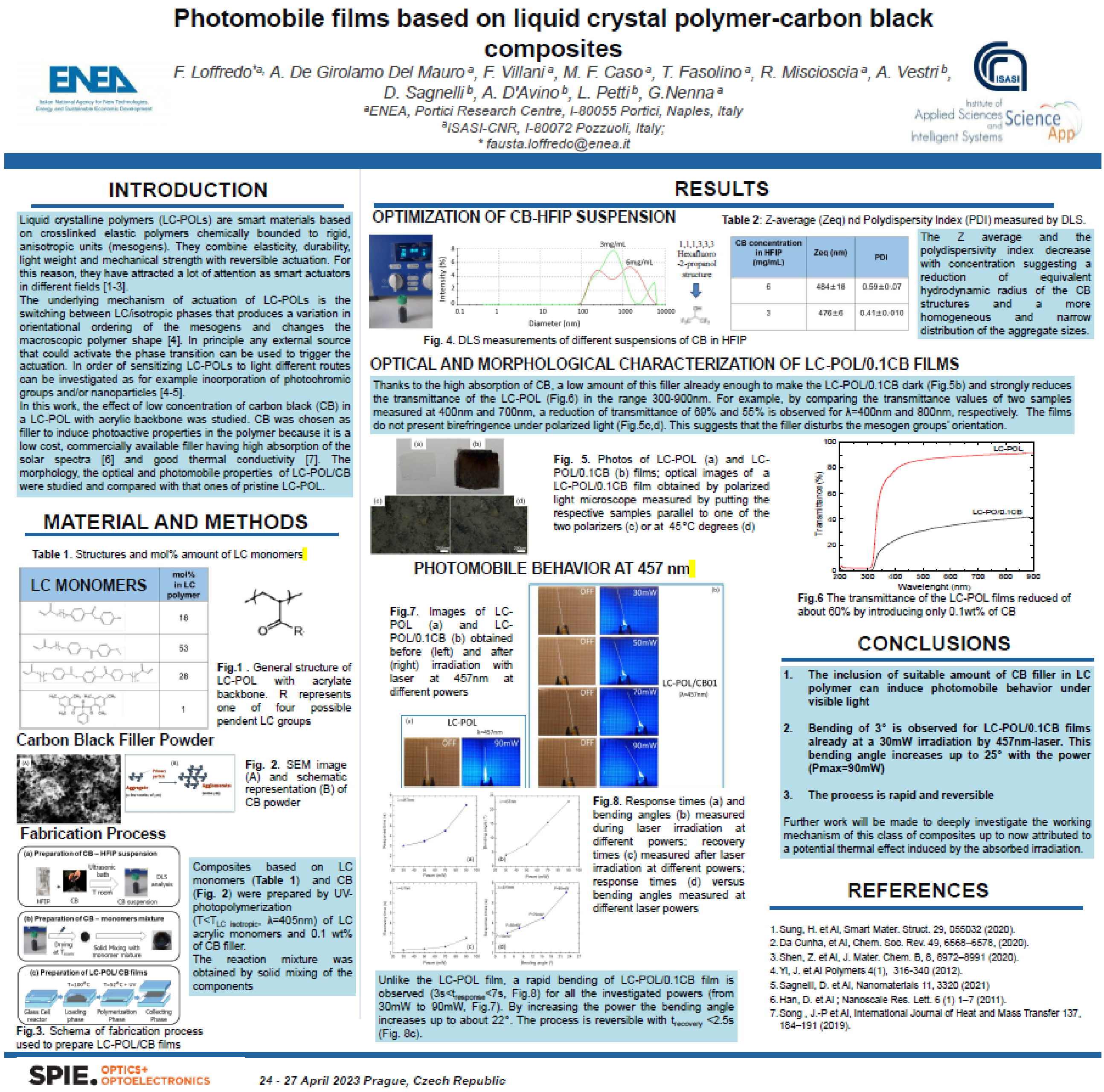

Figure 4: Poster presented by Fausta Loffredo (CNR) in the SPIE Conference, Prague (Czech Republic).

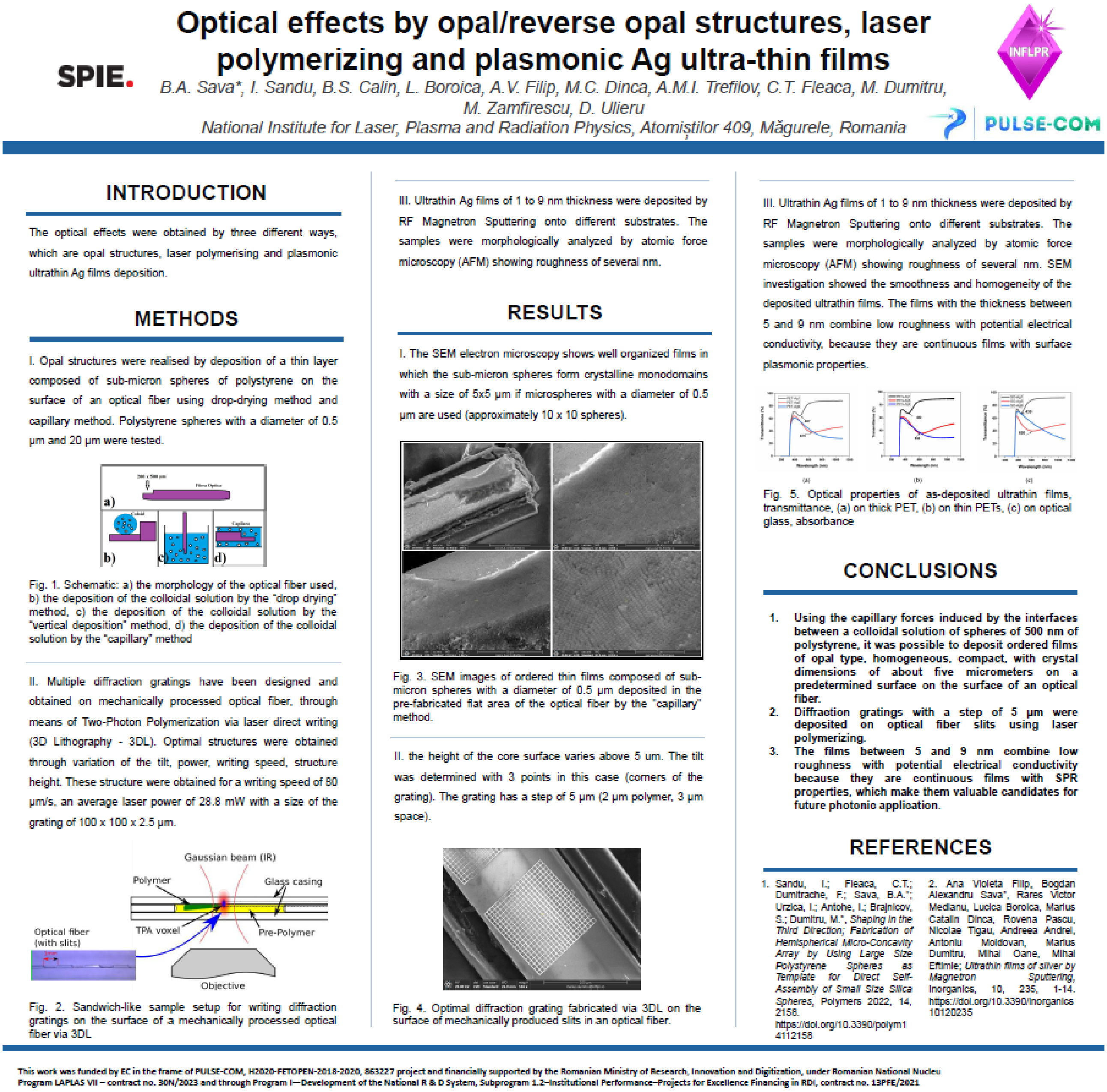

Figure 5: Poster presented by Bogdan Sava (INFLPR) in the SPIE Conference, Prague (Czech Republic).

4 IPR

Within the project, one patent has been accepted (already presented in the deliverable D5.10). A new one has been submitted to cover the harvesting application.

4.1. Patents pending

- Photo-piezoelectric device

Applicants: ENEA, CNR, UGA
Authors: Giuseppe Nenna, Riccardo Miscioscia, Giuliano Sico, Maria Montanino, Gustavo Ardila, Tommaso Fasolino, Lucia Petti, Domenico Sagnelli
Filing date: N/A
European patent application number: N/A

- The portable high integration degree spectrometer/waveselector for spectral analysis in optical networks
Applicants: SITEX 45 SRL
Authors: Dumitru Ulieru, Oana-Maria Ulieru ,Lorandt Szolga, Xavier Vila Gelli
Filing date: May 20th, 2023
National patent OSIM application number: A 2023 00925

4.2. Accepted patent

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; ENEA; UGA
Authors: M Haras, T Skotnicki, M Wlazło, G Kołodziej, G Ardila-Rodriguez, L Petti, G Nenna
Filing date: 21st September 2021
European patent application number: EP21461595.7

Energy Conversion Device And Production Method
ApplicationPublication/Patent Number: EP3782258A1
Publication Date: 2021-02-24
European patent application number: EP19717981.5
Filing Date: 2019-04-11
Authors: Castagna Riccardo, Rippa Massimo, Petti, Lucia, De Girolamo Del Mauro Anna, Nenna Giuseppe, Diletto Claudia, Ardila Rodriguez Gustavo

5 Communication documents

For the final event of the project two documents have been produced (Figure 6): the first one is a leaflet gathering the main elements and results of the project. All the content is compacted in one page. The other one is an extended brochure of 36 pages presenting in detail the main results of the project. The two documents are accessible on the PULSE-COM project website (https://www.pulsecom-h2020.eu/project-results/posters/).

Figure 6: Visual of the first pages of the leaflet (on the left) and of the extended brochure (on the right).