

An experimentally-validated multi-scale materials, process and device modelling & design platform enabling non-expert access to open innovation in the Organic and Large Area Electronics Industry (MUSICODE)

Grand Agreement: 953187

Project Start Date: 01/01/2021

Project Duration: 48 months

Deliverable 7.2

Intermediate Report on Dissemination and Communication

Date: 02-01-2023



This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under the Call DT-NMBP-11-2020 "Open Innovation Platform for Materials Modelling"

| | Project co-funded by the European Commission within Horizon 2020 Research and Innovation Programme | | | |
|---------------------|--|---|--|--|
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| PP | Restricted to other programme participants (including the Commission Service) | | | |
| RE | Restricted to a group specified by the consortium (including the Commission Services) | | | |
| CO | Confidential, only for members of the consortium (excluding the Commission Services) | | | |

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| Draft Revisions: | v1.1 version drafted by E. Doudis on 13/12/2022 | | | | |
|------------------|--|--|--|--|--|
| | v2.0 version approved by coordinator on 02/01/2023 | | | | |

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| | TinniT Technologies GmbH (TINNIT) | Germany |
| | ANSYS (ANSYS) | UK |
| | Esteco SPA (ESTECO) | Italy |
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1. Introduction

This deliverable describes the contribution of the partners on the Dissemination & Communication Activities to increase awareness of project and exploit the desirable outputs within targeted stakeholder groups. These activities include the organization of events, presentations and participations in international events, the participation in Networks, Clusters and Associations and the collaboration with other projects. Additionally, the report refers the utilization of social media accounts as significant tools to promote the project activities to a broad Network of stakeholders.

This report covers the Reporting Period (M1-M24). This information will be updated in the deliverable 7.7, "Final Report on Dissemination & Communication", which will be submitted on M48. Although during this period the COVID-19 pandemic limited travelling, the partners have adapted and transformed some parts of the dissemination activities in hybrid mode or fully on-line mode. As a result, the MUSICODE project has been successful in reaching the mentioned targets.

2. Dissemination and Communication Tools

The exploitation of MUSICODE's impacts will be accomplished through an effective dissemination strategy of the project results. In particular, the tools for dissemination and communication include the participation in international events such as Conferences and Exhibitions, the connection with EU clusters, Networks, Industrial Associations as well as the organization of training activities and meetings. In addition to the above, other tools to disseminate the MUSICODE's activities involve the utilization of MUSICODE's website and social media accounts as well as the design of newsletters, flyers, leaflets, and scientific publications to be distributed to a wide network of stakeholders. It is to be noted that, the dissemination strategy will consider all the IPR & Confidentiality Matters.

MUSICODE applied the following dissemination tools and approaches:

- **Project Website:** The website is the basic promotion and data management tool of the project. The website is updated regularly, and 5000 visitors are targeted during the project.
- Social media (e.g., Facebook, Instagram, Twitter, LinkedIn) to disseminate and promote the project results (Official Pages in M3. Updated daily/weekly. 10,000 website hits, 300 followers in social media).
- **Publications in Scientific Journals** in Open Access mode (Green or Gold). (Target: >10 high impact papers published). Where possible, the consortium members will deposit their scientific peer reviewed final manuscripts and publications through the "green" Open Access Model.
- Organization of Conferences, Summer Schools & Stakeholder Meetings (Organization of 3 Int. Conferences in NANOTEXNOLOGY). The MUSICODE partners have extensive experience in this kind of activities. AUTh in collaboration with HOPE-A and NanoNet (with access to >600 expert entities worldwide) organizes within NANOTEXNOLOGY International Exhibition & Conferences on "Nanotechnologies & Organic Electronics" (nanotexnology.com) the International Conferences in Nanotechnologies (NN), in OEs (ISFOE) and the ISSON Summer School. This event brought together >10.000 participants, >6.000 presentations, networking events, 1000 B2B meetings, and education/expertise of 1000 young scientists. MUSICODE co-organized NANOTEXNOLOGY, Special Workshops in Real-Time Metrology & Quality Control and Schools on OEs.
- Participation and presentations in International Scientific Conferences, Workshops, Symposia, as LOPE-C, IDTechEx Berlin Europe, IDTechEx Santa Clara USA, NANOTEXNOLOGY, World Energy Summit, InterSolar Europe & USA, PVTC, E-MRS, MRS, etc. (Participation in 6 Int. Events every year)
- **Participations in technical, commercial Fairs and Exhibitions** for dissemination to industrial partners & potential target user groups (SolarExpo, International Converting Exhibition Trade Show, Intersolar).
- Newsletters, press releases, flyers (3-page flyer, A4 leaflet, finalized in M3, updated every 6 months).
- Educational Programmes: Training and summer schools based on the newest and most advanced elearning technologies will be integrated in educational programmes at university level.

Networking with European Projects, Clusters and Associations:

- Communication & interaction with other EU Projects and exchange of information to assure coherence of the EU research and avoid useless replication of work. The MUSICODE members organize and also participate in relevant Meetings and Workshops for the communication and collaboration with other R&D Projects, as OIE, OITB, as well as in EPPN, EFFRA, EARTO and EU activities.
- Links and communication with EU Clusters/Platforms/Networks, as EMCC, EMMC, and EPPN, (AUTh is a member), OE-A, Photonics21, EU PV Clusters, *Nanosafety, NANOREG*

3. Dissemination & Communication Activities

This section describes the dissemination and communication activities of the MUSICODE project partners during the Reporting Period M1-M24 (1 Jan 2021 – 31 Dec 2022), along with the details on the performed actions, the profit to the project visibility and impact.

3.1. MUSICODE Public Website



One of the most important tools for the promotion of the project activities is the MUSICODE's Project website at <u>https://musicode.eu/</u>. Uol designed and created the project website (<u>http://musicode.eu</u>). This website is the front-end for the promotion of the project and its results and contains information about the objectives of the project, partners, news related to MUSICODE, events, resources, publications, etc. On the bottom of the page there is acknowledgement to the H2020 with EU flag and the Grand Agreement number.

The activity of the website is monitored with the purpose of gathering information about the website's traffic and how visitors interact with the website. The following figures provide the information on the visitors' statistics of the website from the beginning of the project until now.



Fig. 1: Statistics for the visitors of the MUSICODE's website from the beginning of the project until June 2022

In addition, Uol created the MUSICODE OwnCloud secure server, which includes a document repository, exchange, collaboration: deliverables, dissemination, meeting presentations & minutes, data, etc.

3.2. Social Media Accounts

MUSICODE is also available at Social media pages, i.e. Facebook, Twitter and LinkedIn. Through the Social Media pages MUSICODE's innovations are promoted to several stakeholders among a broad network such as other EU Networks and Associations. From this point of view, Social Media have managed to gain a significant interaction with relevant stakeholders in the field of FPEs, increasing the possibilities for new collaborations in the field of FPEs. The following figures inform about posts on the social media accounts. Various topics regarding the activities and objectives of MUSICODE are posted regularly are made to promote the visibility of the project.

Facebook: https://www.facebook.com/musicodeH2020/



Fig. 2: MUSICODE's Homepage on Facebook

 Twitter: https://twitter.com/musicodeh2020

 Instagram: https://www.instagram.com/musicodeh2020

| | | Instagram | Q Search |
|---|--|---|--|
| ← musicode project 8 Tweets | Q Search Twitter | | musicodeb2020 Follow |
| | New to Twitter? Sign up now to get your own personalized timeline! G Sign up with Google (\$ Sign up with Apple | mc | 1 post 3 followers 3 following Musicode Project An experimentally-validated multi-scale materials, proce: design platform enabling non-expert access to open inno |
| | Sign up with a phone number or em By signing up, you agree to the Terms of Service and Privacy Policy, including Cookle Use. | MUSICOD | |
| @musicodeH2020 An experimentally-validated multi-scale materials, process and device modelling & | | | |
| design platform enabling non-expert access to open innovation in the OLAE | | | ITAGGED |
| 0 Following 8 Followers Tweets & replies Media Likes | | Des Caregori 2 - | |
| musicode project @musicodeH2020 · 9 May We are happy to welcome you to the "Summer School on Multiscale Modelling and Open Innovation Platforms", organized by the Institute of Materials Science and Computing of the University Research Center of Ioannina and hosted by MUSICODE project. musicode.eu/events/summer- | You might like Cardanit @CardanitBPM | | |
| | Trisotech @Trisotech | No vapre a VASSEEVA Ress. 2 North Do Service 2 (2014) Ort Dr. | |

Fig. 3: MUSICODE current Homepage on Twitter and Instagram

LinkedIn: https://gr.linkedin.com/in/musicodeh2020

| Perspectation funding for Research Annovation |
|--|
| musicode |
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| Ą |
| musicode project 1st |
| n experimentally-validated multi-scale materials, process and device modelling & design platform nabling non-expert access to open innovation in the Organic and Large Area Electronics Industry MUSICODE) |
| reee · Contact into |
| connections |
| 5 mutual connections: Stefanos Chaitoglou, Professor Ravi Silva CBE, and 3 others |
| Message More |
| About he goal of the H2020 call 'Open Innovation Platform for Materials Modelling' is to create an open innovation platform or materials modelling to support materials processing and development. Under this call, the EU-funded MUSICODE roject aims to create a multiscale materials-process-device modelling platform for the organic and large area lectronics (OLAE) industry, featuring integrated data management, ontology-based semantic interoperabilitysee more |
| Activity |
| 3 followers |
| usicode project posted this • 1mo |
| /e are happy to welcome you to the "Summer School on Multiscale Modelling and Open Innovation Platforms", rganized by the Institute of Materials Science and Computing of the University Research Center of Ioannina and hosted y MUSICODE project. Registrations are open, till 30th of June, 2022. More information regarding the registrshow more |
| 0 10 |
| Fig. 4: MUSICODE 's page on LinkedIn |

3.3. Publications in Scientific Journals

The consortium members of MUSICODE contributed to the dissemination of project results by depositing their scientific peer reviewed final manuscripts and publications through the "green" Open Access Model. The publications of partners are listed in the following table.

| Title | Authors | Journal | Is Open Access? | DOI | Repository Link | |
|---|---|---|-----------------|--|--|--|
| Position Paper: Open Innovation in Horizon Europe | Natalia Konchakova; Peter Klein; Elefterios Lidorikis; Argiris Laskarakis; Welchy Leite Cavalcanti; Jesper Friis | zenodo.org | Green | <u>10.5281/zenodo.58485</u> <u>52</u> | <u>https://doi.org/10.5281/ze</u> <u>nodo.5848552</u> | |
| A route towards the fabrication of large- scale and high-quality perovskite films for optoelectronic devices | Ehsan Rezaee, Dimitar Kutsarov, Bowei Li, Jinxin Bi & S. Ravi P. Silva | Scientific Reports | Gold | <u>10.1038/s41598-022-</u> <u>10790-z</u> | <u>https://doi.org/10.1038/s4</u> <u>1598-022-10790-z</u> | |
| The electronic stability of tin-halide perovskite charged regions | Cameron Underwood; Zhou Wang; Guosheng Shao; J. David Carey; S. Ravi P. Silva | Materials Advances | Gold | <u>10.1039/d1ma01232k</u> | <u>https://doi.org/10.1039/d1</u> <u>ma01232k</u> | |
| Reconciliation of dipole emission with detailed balance rates for the simulation of luminescence and photon recycling in perovskite solar cells | Urs Aeberhard; Simon Zeder; Beat Ruhstaller | Optics Express | Gold | <u>10.1364/oe.424091</u> | https://infoscience.epfl.ch/ record/286089 | |
| Assessment of Photon Recycling in Perovskite Solar Cells by Fully Coupled Optoelectronic Simulation | Urs Aeberhard; Beat Ruhstaller; Simon Zeder | Physical Review Applied, 17 (1) | Gold | <u>10.1103/physrevapplie</u> <u>d.17.014023</u> | https://doi.org/10.1103/ph ysrevapplied.17.014023 | |
| Scrutinizing thermally stimulated current transients originating from trapped charges in organic semiconductors: A drift-diffusion study | Camilla Vael, Sandra Jenatsch, Simon Züfle, Frank Nüesch, and Beat Ruhstaller | Journal of Applied Physics | Green | <u>10.1063/5.0088426</u> | <u>https://doi.org/10.1063/5.0</u> <u>088426</u> | |
| Phase-field simulation for the formation of porous microstructures due to phase separation in polymer solutions on substrates with different wettabilities | Saeideh Farzaneh Kalourazi, Fei Wang, Haodong Zhang, Michael Selzer, and Britta Nestler | Journal of Physics: Condensed Matter | Gold | <u>10.1088/1361-</u> <u>648X/ac8b4d</u> | <u>https://doi.org/10.1088/13</u> <u>61-648X/ac8b4d</u> | |

3.4. Organization of International Events

During 2021-2022 MUSICODE's members co-organized 2 multi-events, 2 international conferences and a Summer School, which were the following:

- NANOTEXNOLOGY 2021, 3-10 July 2021, Thessaloniki, Greece (specific Workshops, see below)
- 11th Conference and Exhibition on Flexible & Printed Electronics Industry (Targeting Digital Transformation, Green Energy, Lighting, Mobility, IoT, Wearables, Smart Cities, Smart Packaging, ...), 11-12 October 2021, Divani Caravel Hotel, Athens, Greece
- NANOTEXNOLOGY 2022, 2-9 July 2022, Thessaloniki, Greece (specific Workshops, see below)
- 12th International Conference & Exhibition on Green Flexible Printed Electronics Industry (ICEFPE22) and AGRIVOLTAICS 2022, 10-12 October 2022, Divani Caravel Hotel, Athens, Greece
- Summer School on Multiscale Modelling and Open Innovation Platforms, 18-23 July 2022, online event

3.4.1 NANOTEXNOLOGY 2021

MUSICODE has co-organized specific Special Workshops in the framework of NANOTEXNOLOGY 2021 multievent that took place at Thessaloniki, Greece at 3 - 10 July 2021. The event was realized in a hybrid mode, including both a live and on-line participation. This event is organized by since and currently it is established as the largest technology, networking, and matchmaking annual event in Europe with more than 800 participants every year from more than 60 countries. The MUSICODE members have presented several oral presentations at the ISFOE21, at 5-8 July 2021 in Thessaloniki, Greece.

MUSICODE has co-organized the following Special Workshops:

- Workshop on Open Innovation and Standardization for materials characterization, materials modeling and materials process and manufacturing
- Workshop on Computational Modeling
- Workshop on In-line & Real-time Metrology and Quality Control for Nano-Manufacturing
- Special Workshop on EU Projects

Some new results that were presented include:

- Materials Information Management for Organic Electronics
- Computational Modelling for Organic Electronics Nanomaterials
- Novel Results from 7 H2020 Projects in Organic Electronics & Nanotechnology
- Industry needs on Open Innovation Approaches

During **ISFOE21** 10 Oral presentations have been given by MUSICODE members which are listed below.

| Date | Title | Authors | Туро |
|---|--|---|-----------------------------|
| | | 71011015 | туре |
| 05-08/07/2021 Material paramet and machine approaches for t semico | er extraction by traditional learning based fitting he optimization of organic onductor devices | S. Jenatsch, E. Knapp, E. Comi, M. Battaglia, S. Züfle, B. Ruhstaller | Online invited presentation |

Table 2 Presentations of partners in ISFOE21

| 05-08/07/2021 | Fluorination and chlorination effects on the | M. Andrea, K. Kordos, E. | Online oral presentation |
|---------------|--|---------------------------------|-----------------------------|
| | charge transport properties of the IDIC non- | Lidorikis, D. G. Papageorgiou | |
| | fullerene acceptor: An ab-initio investigation | | |
| 05-08/07/2021 | An experimentally-validated multi-scale | E. Lidorikis | Onsite invited presentation |
| | materials, process and device | | |
| | modeling & design platform enabling non- | | |
| | expert access to open in-novation in the | | |
| | organic and large area electronics industry | | |
| 05-08/07/2021 | Nonlinear Band Gap Function Of Mixed B Site | C. C. L. Underwood, J. D. | Online oral invited |
| | 2D Ruddlesden-Pop-per Perovskites Via Ab- | Carey. S. R .P. Silva | presentation |
| | Initio Calculations | | |
| 05-08/07/2021 | Design rules for organic and perovskite | A. Laskarakis, E. Prountzou, A. | Onsite poster presentation |
| | photovoltaic nano-architectures based on | Zachariadis, S. Logothetidis | |
| | optical simulation | | |
| 05-08/07/2021 | Optimization of electron transport layer | E. Doudis, C. Kapnopoulos, E. | Onsite oral presentation |
| | material for fully printed organic solar cells | Mekeridis, C. Varlamis, A. | |
| | and investigation of the effect of ultraviolet | Laskara-kis, S. Logothetidis | |
| | radiation on their stability | | |
| 05-08/07/2021 | Integration of material modelling with | C. Kavka | Online invited presentation |
| | business decision support systems | | |
| 05-08/07/2021 | Towards a Carbon Net Zero World with | (Keynote) S.R.P. Silva | Online invited presentation |
| | Nanoscale Designed Plastic Electronic Energy | | |
| | Harvesting De-vices and Systems | | |
| 05-08/07/2021 | Organic Vapor Phase Deposition (OVPD») of | P. K. Baumann | Online invited presentation |
| | OLED for Organic Dis-play and Lighting | | |
| | Applications | | |

In the following, some information about the Workshops of ISFOE21 co-organized by MUSICODE are provided.

Workshop on Organic and Large Area Electronic (OLAE) Materials: The Workshop on Organic and Large Area Electronic (OLAE) Materials reveals, discusses and contributes to the solution of fundamental issues on the synthesis and thin film fabrication of novel organic semiconductors (as conjugated polymers, evaporated small molecules or solution processed small molecules) and electrode materials, efficient charge transfer mechanisms, optimization & control of morphology.

MUSICODE participated in this workshop with the presentations:

- Fluorination and chlorination effects on the charge transport properties of the IDIC non-fullerene acceptor: An ab-initio investigation, M.Andrea, UOI
- Sustainable laser ablation processes for fabrication of plasmonic colloidal silver NPs to improve electrical and optical properties of printed PEDOT:PSS nanolayers, Prof. S.R.P. Silva from University of Surrey, C.Kapnopoulos, AUTh.
- Fully printed ternary organic photovoltaic devices based on PPDT2FBT- PC70BM BTP-12 system, G. Atsas, Poster presentation, AUTh.
- Towards a Carbon Net Zero World with Nanoscale Designed Plastic Electronic Energy Harvesting Devices and Systems, S. Ravi P. Silva, USUR

Workshop on OPVs and Perovskites PVs: This Workshop contributes to solving of all aspects covering the synthesis, thin film fabrication of new organic semiconductor (conjugated polymers, evaporated small molecules or solution processed small molecules) and electrode materials, efficient charge transfer mechanisms, optimization & control of blend morphology, device architectures, lifetime and stability, and mass manufacturing.

MUSICODE participated in this workshop with the presentations:

- Nonlinear Band Gap Function of Mixed B Site 2D Ruddlesden-Popper Perovskites Via Ab-Initio Calculations, C. C. L. Underwood, USUR
- Design rules for organic and perovskite photovoltaic nano-architectures based on optical simulation, A.Laskarakis, AUTh
- Optimization of electron transport layer material for fully printed organic solar cells and investigation of the effect of ultraviolet radiation on their stability, E.Doudis, AUTh

Workshop on Computational Modelling: This Workshop explored state-of-the-art methodologies and approaches for the modelling and optimization of materials, the material's behavior and/or nano-device manufacturing processes, as well as multiscale computational approaches that can play a key role towards the further advancement of the corresponding technologies and enable the manufacturing and characterization of breakthrough devices and systems.

The Workshop included Theoretical and Computational Modeling approaches to the following topics:

- Ontology and interoperability
- Computational materials design and discovery
- High-throughput methods for materials characterization
- Machine learning applications for materials
- Material properties and processes at the nano-scale
- Diffusion and film growth
- Photonics, plasmonics, phononics and electronics
- Strongly correlated electron systems, magnetism and spintronics
- Multiscale modeling of devices and processes
- Graphene and related 2D materials
- Inorganic & Hybrid halide perovskites
- Organic materials and properties
- Organic electronic devices
- Charge-transfer & exciton dynamics at hetero-interfaces

MUSICODE participated in this workshop with the presentation:

Material parameter extraction by traditional and machine learning based fitting approaches for the optimization of organic semiconductor devices, S. Jenatsch, Fluxim

Workshop on Open Innovation and Standardization: The Workshop on Open Innovation and Standardization for materials characterization, materials modeling and materials process and manufacturing combined efforts to promote and progress in state-of-the-art Scientific and Research fields which require the compatibility with internationally accepted roadmaps and frameworks, towards the development of future standards. The topics of the workshop included:

- Open Innovation for multiscale modeling of materials
- Open Innovation for multiscale characterization of materials
- Open and FAIR Data
- Ontologies and Interoperability
- Modeling Data Analysis (MODA)
- Characterization Data (CHADA)

- Process and Manufacturing
- Standardization needs in the manufacturing sector
- Industry needs on Open Innovation approaches
- Business Models and Sustainability for Open Innovation Databases



Fig. 5: Workshop on Open Innovation during ISFOE21

MUSICODE participated in this workshop with the presentations:

An experimentally-validated multi-scale materials, process and device modeling & design platform enabling non-expert access to open innovation in the organic and large area electronics industry, E.Lidorikis, UOI

Integration of material modelling with business decision support systems, C.Kavka, ESTECO



Fig. 6: Photos from the live participants of ISFOE21

MUSICODE partner UOI in collaboration with AUTh contributed to the dissemination of MUSICODE's activities with a booth in EXPO21 of NANOTEXNOLOGY.



Fig. 7: MUSICODE'S booth in EXPO21

3.4.2 11th Conference and Exhibition on Flexible & Printed Electronics Industry

On 11-12 October 2021, MUSICODE supported the organization of the 11th Conference and Exhibition on Flexible & Printed Electronics Industry (Targeting Digital Transformation, Green Energy, Lighting, Mobility, IoT, Wearables, Smart Cities, Smart Packaging, ...), that took place in Divani Caravel Hotel, Athens, Greece. The Conference & Exhibition brought together Key Industrial Players, End-Users, Entrepreneurs, Investors, Topclass Scientists, Engineers, Policy Makers and Representatives from the National, European and International Authorities to discuss, network and establish the strategy and policy for boosting the rapidly evolving Flexible & Printed Electronics (FPEs) hundred-Billion euros Industry.

11th Conference and Exhibition on Flexible & Printed Electronics Industry was organized as hybrid even, both live and virtual and takes place annually in Athens, Greece. The main subjects of the event are Energy, IoT, Wearables, Electronics. OET presented its products in Organic Electronic applications by presenting various demonstrations, such as printed OLEDs and EL devices for signaling in textiles and automotive parts, OPVs integrated in bus stop shelter and glass integrated OPVs with high transparency.

All participants had the opportunity to learn about MUSICODE through the presentations given by the majority of the partners, the MUSICODE Poster, the distribution of MUSICODE brochures and through discussions that took place regarding project's objectives and innovations.



Fig. 8: Brochure of the 11th International Conference & Exhibition that took place at 11-12 October 2021, Athens, Greece

Below, the titles of MUSICODE members' presentations at 11th International Conference & Exhibition along with some photos of their presentations are exhibited.

| Date | Title | Authors | Туре |
|--|--|---|------------------|
| 11-12/10/2021 Open Innovation Platform for modelling | | E. Lidorikis, C. Trapalis, K. Kaklamanis, | Onsite Invited |
| | organic electronic material properties, process, | M. Andrea, K. Kordos and D.G. | presentation |
| | and devices | Papageorgiou | |
| 11-12/10/2021 | Revolutionizing FPEs Manufacturing by In-line | A. Laskarakis | Onsite poster |
| | Metrology, Quality control for FPEs | | presentation |
| | manufacturing and Open Innovation | | |
| 11-12/10/2021 | Organic Vapor Phase Deposition (OVPD [®]) of | P. K. Baumann | Online invited |
| | OLED for Organic Indus-trial Applications | | presentation |
| 11-12/10/2021 | Green Flexible Printed Power for a Sustainable | S.R.P. Silva | Invited Speaker, |
| | World of Wearables | | presentation |

| Table | 3 | Presentations of | partners in | 11th | International | Conference | & | Exhibition |
|-------|---|------------------|-------------|------|---------------|------------|---|------------|
| | _ | | | | | | _ | |



Fig. 9: Prof. E. Lidorikis and Prof. A. Laskarakis, during their presentations at FPE 11.

The 11th International Conference & Exhibition on Green Flexible & Printed Electronics Industry also included the participation of Greek Minister of Development and Investments Mr. Adonis Georgiadis and head of Dr. Christos Dimas office, Deputy Minister of Research and Technology, Mr. Michalis Dritsas.



MUSICODE partners have also been involved in the organization of the NANOTEXNOLOGY 2022 multi-event at Thessaloniki, Greece at 2 – 9 July 2022. The event was realized in a hybrid mode, and an increased number of live participants related to 2021 and 2020.

MUSICODE supported a series of special workshops which composed the program of the main events:

- Workshop on Open Innovation and Standardization for materials characterization, materials modeling and materials process and manufacturing
- Workshop on Computational Modeling
- Workshop on In-line & Real-time Metrology and Quality Control for Nano-Manufacturing
- Special Workshop on EU Projects

Especially, during ISFOE22, and the workshop on open innovation and standardization, 10 Oral and 2 poster presentations had been given by MUSICODE members. These presentations of ISFOE22 are included at the table 5.



Fig. 10: Photos from Prof. E. Lidorikis and Prof S. Ravi P. Silva, during their presentations at ISFOE22.

At the following, some information is provided about the 7 Workshops of ISFOE22 co-organized by MUSICODE.

The Workshop on **Organic and Large Area Electronic (OLAE)** Materials discusses and contributes to the solution of the fundamental issues on the synthesis and thin film fabrication of novel organic semiconductors (as conjugated polymers, evaporated small molecules or solution processed small molecules) and electrode materials, efficient charge transfer mechanisms, optimization & control of morphology.

MUSICODE participated in this workshop with the oral invited presentation "**Organic Electronics for a Net Zero Carbon Future Sustainable Society**" that was given by Prof. S.R.P. Silva from University of Surrey.

The **Workshop on OPVs and Perovskites PVs** contributes to solving of all aspects covering the synthesis, thin film fabrication of new organic semiconductor (conjugated polymers, evaporated small molecules or solution processed small molecules) and electrode materials, efficient charge transfer mechanisms, optimization & control of blend morphology, device architectures, lifetime and stability, and mass manufacturing.

MUSICODE participated in this workshop with the presentations:

- Quantitative Analysis of Upscaling Losses and Defects in Printed Solar Cells by Employing FEM Simulations, S. Jenatsch, Fluxim
- Sustainable laser ablation processes for fabrication of plasmonic colloidal silver NPs to improve electrical and optical properties of printed PEDOT:PSS nanolayers, Prof. S.R.P. Silva from University of Surrey, C.Kapnopoulos, AUTh.
- Fully printed ternary organic photovoltaic devices based on PPDT2FBT- PC70BM BTP-12 system, G. Atsas, Poster presentation, AUTh.

Workshop on Computational Modeling of Materials, Devices & Processes: This Workshop about computational modelling explored state-of-the-art methodologies and approaches for the modelling and optimization of materials, the material's behavior and/or nano-device manufacturing processes, as well as

multiscale computational approaches that can play a key role towards the further advancement of the corresponding technologies and enable the manufacturing and characterization of breakthrough devices and systems. During the Workshop a series of Invited talks, Oral and Poster presentations have been given covering different computational approaches (ranging from the atomic to the macro-scale or multiscale) applied on a broad range of subjects. This was one of the main workshops of MUSICODE at ISFOE.

MUSICODE participated in this workshop with the presentation:

• Cross-scale simulation method for the prediction of R2R-printing, drying, and phase separation processes in the eld of organic electronics production, A. Kneer, TinniT Technologies GmbH

Workshop on Open Innovation and Standardization: The Workshop on Open Innovation and Standardization for materials characterization, materials modeling and materials process and manufacturing combined efforts to promote and progress in state-of-the-art Scientific and Research fields which require the compatibility with internationally accepted roadmaps and frameworks, towards the development of future standards.

During the Workshop a series of Invited talks, Oral and Poster presentations have been given by representatives from currently running EC R&D projects in that cover different aspects of Open Innovation for materials characterization & modeling (ranging from the atomic to the macro-scale or multiscale) applied on a broad range of subjects and applications.

MUSICODE participated in this workshop with the presentations:

- Building an industry driven "innovation ecosystem" through the establishment of platforms for characterization, Donna Dykeman, ANSYS
- MUSICODE Project, E.Lidorikis, University Of Ioannina
- Facilitators of Open Innovations Who are They? A case study in Advanced Protective Coatings, N. Konchakova, Helmholtz-Zentrum Hereon
- From MODA to executable workflows via the BPMN standard, D. Campagna, ESTECO SpA
- The European Open Innovation Ecosystem: How Open Innovation Test Beds, Open Access Pilot Lines and Digital Innovation Hubs may help European SME, J. Fahlteich, KETMarket GmbH
- An integrated open-access platform for materials modelling innovation: OpenModel, O. M. Roscioni, Goldbeck Consulting Ltd.



Fig. 11: Representatives from the H2020 Project VIPCOAT discussing with the MUSICODE Coordinator Prof. E. Lidorikis at the exhibition area of the ISFOE22

MUSICODE members participated live with exhibition booths and demonstrators in printed OPVs and OLEDs including, Energy Efficient Windows, solar pergolas, wearables and the Solar Parking and EV Charging Station with integrated OPVs. MUSICODE had also a booth at EXPO22 to extend the dissemination of MUSICODE's activities.



Fig. 12: Photos from MUSICODE's partners during the EXPO22.

3.4.4 12th International Conference & Exhibition on Green Flexible Printed Electronics Industry

On 10-12 October 2022, MUSICODE supported the 12th International Conference & Exhibition on Green Flexible Printed Electronics Industry (**ICEFPE22**) and AGRIVOLTAICS 2022, which took place in Divani Caravel Hotel, Athens, Greece. All participants had the opportunity to learn about MUSICODE through the presentations given by most of the partners, the MUSICODE Poster, the distribution of MUSICODE brochures and through discussions that took place regarding project's objectives.

Below, some photos of MUSICODE members' presentations at 12th International Conference & Exhibition are presented. The presentations in which MUSICODE participated at 12th International Conference & Exhibition are included at the table 5.





Fig. 13: Prof. S.R.P.Silva, Prof. A. Laskarakis and Prof. E. Lidorikis during their presentations at ICEFPE22.



Fig. 14: MUSICODE partners during their meeting at ICEFPE22.

3.4.5 Summer School on Multiscale Modelling and Open Innovation Platforms

The MUSICODE summer school was organized as an online event in the week 18-23 July 2022, (<u>https://musicode.eu/events/summer-schools/2022</u>), with 14 lecturers on computational courses on:

- Multiscale materials modelling
 - $\circ \quad \text{Electronic Modelling} \\$
 - $\circ \quad \text{Atomistic Modelling} \\$
 - Coarse grain Modelling
 - Mesoscale Modelling
 - o Continuum Modelling
 - o Device Modelling
- Multiscale Simulation Frameworks
- EU projects on Open Innovation Platform
 - o OpenModel
 - VIPCOAT
 - MUSICODE

The school poster is shown in Fig. 17a, the lecturers in Fig. 17b, and the school program in Fig. 17c. The summer school was a collaborative effort between the 3 OIP projects and included invited lecturers in addition to lecturers from the 3 OIP projects.





Figure 17a. The MUSICODE summer school advertising poster



Figure 17b. Lecturers of the MUSICODE summer school on Multiscale Modelling and Open Innovation Platforms, online event in 18-23 July 2022.

| (GR Time) | Monday 18/07 | Tuesday 19/07 | Wednesday 20/07 | Thursday 21/07 | Friday 22/07 | Saturday 23/07 |
|-------------|---|---|--|---|--|-------------------|
| 10.30-11.00 | Welcome | | | | | |
| 11.00-12.00 | Atomistic Modelling of charge | Atomistic and Coarse- grained Models of Polymeric | Mesoscale Modelling | Heat and mass transport processes in | Modelling Platforms: | |
| 12.00-13.00 | transport in OE materials (Dimitris Papageorgiou, UoI) | Nanostructured Materials: From Atoms to Macroscopic Properties (Vangelis Harmandaris, Cyl) | of microstructures (Britta Nestler, Michael Kellner, KIT) | porous media using the dual-porosity approach (Aron Kneer, TinniT) | models, data, ontologies, and workflows (Borek Patzak, CVUT) | Exam |
| 13.00-14.30 | | | Launch Break | | | |
| 14.30-15.30 | Atomistic Modelling of charge | Electronic Modelling of | Scale-bridging Simulations and | Device level Modelling of OPVs and OLEDs | Modelling Platforms: models, data, ontologies, and workflows (Borek Patzak, CVUT) | |
| 15.30-16.30 | - transport in OE materials (Dimitris Papageorgiou, UoI) | (George Volonakis, ISCR) | Knowledge Transfer (Michael Selzer, KIT) | (Urs Aeberhard, Fluxim) | OpenModel Project (Dr. Welchy Leite Cavalcanti, Dr. Arrigo Calzolari) | |
| 16.30-17.00 | .00 Coffee Break | | | | | |
| 17.00-18.00 | Atomistic and Coarse-grained Models of Polymeric Nanostructured Materials: From Atoms to Macroscopic Properties | Electronic Modelling of Perovskite PV materials (George Volonakis, ISCR) | Continuum Modelling of materials processing (Aron Kneer, TinniT) | Device level Modelling of OPVs and OLEDs (Sandra Jenatsch, Fluxim) | VIPCOAT Project (Peter Klein, Fraunhofer ITWM and Natalia Konchakova, Helmholtz- Zentrum Geesthacht) | |
| 18.00-19.00 | (Vangelis Harmandaris, Cyl) | | | | MUSICODE Project (Elefterios Lidorikis, UoI) | |

Figure 17c. Program of the MUSICODE summer school.

In the school we had ~50 students enrolled from Greece and Europe, and it culminated in a final examination and certificate of accomplishment to those students that successfully completed the exam.

3.5. Presentation & Participations in International Events

The dissemination and communication activities of MUSICODE project are listed in the following table.

| Date | Event/Conference |
|----------------|---|
| 15/06/2021 | Greek National Press Conference |
| 6-10/06/2021 | Extended Semantic Web Conference (ESWC) 2021 (virtual) |
| 4-8/07/2021 & | EU Project Networking Session (Online), NANOTEXNOLOGY 2021-2022, Thessaloniki 4-8 July and 3-9 |
| 3-9/07/2022 | July |
| 4-8 /07/2021 & | NANOTEXNOLOGY 2021-2022, Thessaloniki: |
| 3-9/ 07/2022 | Special workshop on computational modelling and open innovation platforms (OpenModel & VIP- |
| | COAT with invited presentations) |
| 3-10/07/2021 & | NANOTEXNOLOGY 2021-2022: ISSON21/ISSON22 Summer Schools (Thessaloniki) |
| 2-9/07 /2022 | |
| 5-9/07/2021 & | EXPO21-EXPO22 in NANOTEXNOLOGY 2021-2022: MUSICODE booth with presentation & |
| 4-8/07 /2022 | dissemination material |
| 2-3/09/2021 | 1st technical meeting of Open Innovation Platforms for Materials Modelling (Brussels), MUSICODE, |
| | OpenModel, VIPCOAT |
| 11-12/10/2021 | 11th International Conference & Exhibition on Green Flexible & Printed Electronics Industry, Divani |
| | Caravel Hotel, Athens, Greece |
| 17-19/11/ 2021 | International CAE Conference and Exhibition Research Agora |
| | (Vicenza, Italy) |
| 10-12/10/2022 | 12th International Conference & Exhibition on Green Flexible & Printed Electronics Industry, Divani |
| | Caravel Hotel, Athens, Greece |
| 23–24/03/2022 | LOPEC Exhibition, München, Germany |
| 10-13/05/2022 | Intersolar Exhibition, May 10–13, 2022, München, Germany |
| 4-8 /07/2021 & | Special Workshop on Open Innovation and Standardization for materials characterization, materials |
| 3-9/ 07/2022 | modeling and materials process and manufacturing within ISFOE22 |
| 15/09/2021 | Talk, "Information Data Management System to Enable ICME workflows" EUROMAT2021 remote |
| | event |
| 03/11/2021 | Webinar, "Research Project: Enabling ICME workflows with Granta MI and optiSLang", MIDay |
| 07/10/2021 | Invited Talk, "Materials Databases and Ontology: a perspective", OMDI2021 - Ontologies for |
| | Materials-Databases Interoperability |
| 26/10/2021 | Invited Talk, "Information Data Management System to Enable ICME workflows", SFI PhysMet |
| | Consortium Meeting |
| 07-09/9/2022 | International Conference on Simulation of Organic Electronics and Photovoltaics (SIMOEP 2022) |
| 15-16/03/2022 | "Innovation 5.0: Open Translation Environment for materials and manufacturing value chains" |
| 05-06/10/2022 | Collaboration Workshop Open Innovation Facilitation in Horizon Europe |
| 27-29/09/2022 | Materials Science and Engineering MSE Congress, Darmstadt, Germany |
| 28/11/2022 | PEROSPACE workshop: Perovskite Solar Module Fabrication & Commercialization |

 Table 4 Dissemination & Communication activities in which MUSICODE partners participated

MUSICODE's partners attended several (online) conferences in 2021-2022 and presented the developments on continuum modelling activities. Table 5 lists the scientific conferences at which MUSICODE results have been presented:

| Date | Event/Conference | Title | Authors | Туре |
|---------------|--|---|--|--|
| 15/01/2021 | Next Generation Materials for Solar Photovoltaics 2020, Royal Society of Chemistry, London | Ab-initio Calculations of Tin-Halide Perovskite Solar Cells | C. Underwood, Z.Wang, G. Shao, J. D. Carey, S.R.P. Silva | Poster presentation |
| 09-12/03/2021 | nanoGe Spring Meeting 21 | Influence of Cation on Nonlinear Band Gap Dependence of Pb-Sn 2D Ruddlesden-Popper Perovskite | C. Underwood, J.D. Carey, S.R.P. Silva | Oral presentation & Poster presentation |

Table 5 Presentations and participations of partners in international events

| 08-12/03/2021 | Faculty development | Halide Perovskites: from materials to | R. Misra, S.R.P. Silva | Oral |
|---|--|---|---|--|
| | programme on S.R.P. | photovoltaic devices | | presentation |
| | Silva Quality | | | |
| | Engineering and | | | |
| | Technological | | | |
| | advances in materials | | | |
| | and devices. Sharda | | | |
| | University. India | | | |
| 13-16/04/2021 | Tandem PV | Onto-electronic simulation of | U Aeberbard S Zeder A | Online poster |
| 10 10, 0 1, 2021 | conference | nerovskitesilicon tandems for device | Schiller B Blülle B | nresentation |
| | conterence | analysis & ontimization | Bubstaller | presentation |
| 17 22/04/2021 | MPS Spring 21 | Nonlinear Band Gan Dependence of | | Oral |
| 17-23/04/2021 | WING Spring 21 | Mixed P Site 2D Buddlesden Depender | C. Olderwood, J.D. Carey, | procentation |
| | | Borovskitos | 5.R.F. 511Va | presentation |
| 17 22/04/2021 | MDC Coring 21 | PELOVSKILES | C Underwood 7 Wong | Oral |
| 17-23/04/2021 | IVIKS Spring 21 | Charged Tin Helide Derevelites | C. Chao I. D. Caray, C. D. | Urdi |
| | | Charged TIN-Halide Perovskites | G. Shao, J. D. Carey, S.R.P. | presentation |
| 4445/05/0004 | | | SIIVa | |
| 14-15/05/2021 | International | Halide perovskites and organic | R. Misra, S.R.P. Silva | Oral |
| | Conference on | photovoltaics: from materials to | | presentation |
| | Functional Materials | devices | | |
| | and Applied Physics | | | |
| | (FMAP 2021), SVNIT, | | | |
| | India | | | |
| 24-28/05/2021 | 13th International | Precursor Effect on Lead - Tin Mixed | S.M. Silva, K.D.G.I. | Poster |
| | Conference on Hybrid | Perovskite Solar Cells | Jayawardena and S.R.P. | presentation |
| | and Organic | | Silva | |
| | Photovoltaics (HOPV) | | | |
| 24-28/05/2021 | 13th International | Slot Die Coating as the Scalable | E. Rezaee and S.R.P. Silva | Poster |
| | Conference on Hybrid | Method for Perovskite Thin Film | | presentation |
| | and Organic | Deposition | | |
| | Photovoltaics (HOPV) | | | |
| | | | | |
| 24-28/05/2021 | 13th International | Increased Band Gap Bowing In Lead- | C. Underwood, J.D. Carey, | Poster |
| 24-28/05/2021 | 13th International Conference on Hybrid | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper | C. Underwood, J.D. Carey, S.R.P. Silva | Poster presentation |
| 24-28/05/2021 | 13th International Conference on Hybrid and Or-ganic | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites | C. Underwood, J.D. Carey, S.R.P. Silva | Poster presentation |
| 24-28/05/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites | C. Underwood, J.D. Carey, S.R.P. Silva | Poster presentation |
| 24-28/05/2021 24-28/05/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva | Poster presentation Poster |
| 24-28/05/2021 24-28/05/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva | Poster presentation Poster presentation |
| 24-28/05/2021 24-28/05/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva | Poster presentation Poster presentation |
| 24-28/05/2021 24-28/05/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva | Poster presentation Poster presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. | Poster presentation Poster presentation Online oral |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. | Poster presentation Poster presentation Online oral presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller | Poster presentation Poster presentation Online oral presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller | Poster presentation Poster presentation Online oral presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of Engineering | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of Engineering | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 05-08/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of Engineering Nanotexnology/ISFOE | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future Material parameter extraction by traditional and machine learning | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva S. Jenatsch, E. Knapp, E. | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation Online invited presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 05-08/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of Engineering Nanotexnology/ISFOE | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future Material parameter extraction by traditional and machine learning baced fitting approaches for the | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva S. Jenatsch, E. Knapp, E. Comi, M. Battaglia, S. Züflo, P. Pubetallor | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation Online invited presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 05-08/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of Engineering Nanotexnology/ISFOE | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future Material parameter extraction by traditional and machine learning based fitting approaches for the antimization of arganic comicon | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva S. Jenatsch, E. Knapp, E. Comi, M. Battaglia, S. Züfle, B. Ruhstaller | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation Online invited presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 05-08/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of Engineering Nanotexnology/ISFOE | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future Material parameter extraction by traditional and machine learning based fitting approaches for the optimization of organic semicon- ductor dwices | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva S. Jenatsch, E. Knapp, E. Comi, M. Battaglia, S. Züfle, B. Ruhstaller | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation Online invited presentation |
| 24-28/05/2021 24-28/05/2021 20-25/06/2021 01-02/07/2021 05-08/07/2021 | 13th International Conference on Hybrid and Or-ganic Photovoltaics (HOPV) 13th International Conference on Hybrid and Organic Photovoltaics (HOPV) IEEE PVSC CESEAR, Royal Academy of Engineering Nanotexnology/ISFOE | Increased Band Gap Bowing In Lead- Free 2D Ruddlesden-Popper Perovskites Förster Resonance Energy Transfer (FRET) in Non-Fullerene Acceptor Containing Organic Solar Cells Photon recycling in perovskite solar cells assessed by a detailed-balance compatible dipole emission model Key Technologies Shaping the Future Material parameter extraction by traditional and machine learning based fitting approaches for the optimization of organic semicon- ductor devices | C. Underwood, J.D. Carey, S.R.P. Silva R. Misra, S.R.P. Silva U. Aeberhard, S. Zeder, B. Ruhstaller S.R.P. Silva S. Jenatsch, E. Knapp, E. Comi, M. Battaglia, S. Züfle, B. Ruhstaller | Poster presentation Poster presentation Online oral presentation Invited Speaker, presentation Online invited presentation |
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| | | Perovskites Via Ab-Initio Calcu- lations | | |
|-----------------|---------------------|---|---------------------------------|------------------|
| 05-08/07/2021 | Nanotexnology/ISEOE | Design rules for organic and perov | A Laskarakis F | Onsite noster |
| 05-00/07/2021 | Nanotexhology/ISFUE | skite photovoltais pape archites | A. Laskalakis, L. | procontation |
| | | turos based on entical simulation | S Logothotidis | presentation |
| 05-08/07/2021 | Nanotexnology/ISEOE | Ontimization of electron transport | F Doudie C | Onsite anal |
| 05-06/07/2021 | Manutexhology/ISFUE | laver material for fully printed | L. DOUUIS, C. Kannonoulos, E | presentation |
| | | ayer material for fully printed | Kaphopoulos, E. | presentation |
| | | of the effect of ultraviolet rediction | Niekeriuis, C. Varianiis, A. | |
| | | of the effect of ultraviolet radiation | Laskarakis, S. Logothetiuis | |
| 05 00/07/2024 | N 1 (10505 | on their stability | | |
| 05-08/07/2021 | Nanotexnology/ISFOE | Integration of material modelling | C. Kavka | Online invited |
| | | with business decision support | | presentation |
| | | systems | | |
| 05-08/07/2021 | Nanotexnology/ISFOE | Towards a Carbon Net Zero World | (Keynote) S.R.P. Silva | Online invited |
| | | with Nanoscale Designed Plastic | | presentation |
| | | Electronic Energy Harvesting De-vices | | |
| | | and Systems | | |
| 05-08/07/2021 | Nanotexnology/ISFOE | Nonlinear Band Gap Function of | C. C. L. Underwood, J. D. | Online invited |
| | | Mixed B Site 2D Ruddlesden-Pop-per | Carey. S.R.P. Silva | presentation |
| | | Perovskites Via Ab-Initio Calculations | | |
| 05-08/07/2021 | Nanotexnology/ISFOE | Organic Vapor Phase Deposition | P. K. Baumann | Online invited |
| | | (OVPD [®]) of OLED for Organic Dis-play | | presentation |
| | | and Lighting Applications | | |
| 23/07/2021 | ClimateChange Al 21 | Virtual Screening for Perovskites | C. Underwood and S.R.P. | Poster |
| | | Discovery | Silva | presentation |
| 03/09/2021 | 43-Engineers Forum | Future energy provisions enabled via | S.R.P. Silva | Invited Speaker, |
| | - | nanotechnology or Now is the Time | | presentation |
| | | for Energy Materials Research to | | - |
| | | Save the Planet | | |
| 06-09/09/2021 | International | Dimensionally and environmentally | M. Delkowski, C.T.G. | Oral |
| | Conference on | ultra-stable polymer composites | Smith, J.V. Anguita, S.R.P. | presentation |
| | Diamond and Carbon | reinforced with carbon fibres | Silva | |
| | Materials | | | |
| 06-10/09/2021 | EU PVSEC | Assessment of photon recycling in | S. Zeder, U. Aeber-hard, | Online oral |
| | | perovskite solar cells by full opto- | B. Ruhstaller | presentation |
| | | electronic simulation | | |
| 13-17/09/2021 | NUSOD | Rigorous simulation of photon re- | U. Aeberhard. S. Zeder. B. | Online oral |
| - , , - | | cycling effects in perovskite solar | Ruhstaller | presentation |
| | | cells and LEDs | | presentation |
| 05-07/10/2021 | ALMI (NanoGE) | A robust routine for reliable 1-D | A. Cabas Vidani, S. | Online oral |
| 00 07, 20, 2022 | / (/ (0.000 0) | transient photoluminescence | lenatsch U Aeber-hard | presentation |
| | | simulations | B. Ruhstaller | presentation |
| 07/10/2021 | Ontologies for | Materials Databases and Ontology: a | Davide Di Stefano | Invited Speaker |
| 0., 10, 2021 | Materials-Databases | perspective | | Presentation |
| | Interoperability | herebeering. | | |
| 11-12/10/2021 | 11th FPF Industry | Open Innovation Platform for | F. Lidorikis, C. Tranalis, K | Onsite Invited |
| | | modelling organic electronic material | Kaklamanis M Andrea K | presentation |
| | | properties process and devices | Kordos and D.G. | presentation |
| | | properties, process, and devices | Panageor-giou | |
| 11-12/10/2021 | 11th EPE Industry | Revolutionizing EPEs Manufacturing | Δ Lackarakic | Onsite poster |
| 11-12/10/2021 | TTULEFE MUUSUY | hy In-line Metrology Ouslity control | A. LOSKOI OKIS | presentation |
| | | for EPEs manufacturing and Open | | presentation |
| | | Innovation | | |
| 11-12/10/2021 | 11th EDE Inductor | Organic Vanor Phase Denosition | D K Paumann | Online invited |
| 11-12/10/2021 | IIII FPE Industry | (OVDDa) of OLDD for Orderia lade | r. n. Bdumann | |
| | | (UVPD") OF OLED FOR Organic Indus- | | presentation |
| 44 42 40 12025 | | | | In the d.C. J |
| 11-12/10/2021 | 11th FPE Industry | Green Flexible Printed Power for a | S.R.P. Silva | invited Speaker, |
| 20/10/2000 | | Sustainable World of Wearables | | presentation |
| 26/10/2021 | SFI PhysMet | Information Data Management | Davide Di Stefano | Presentation |
| 1 | Consortium Meeting | System to Enable ICME workflows | | 1 |

| 06-07/11/2021 | ICEM 2021 | Energy Materials for Wearable and Flexible Electronics in a Sustainable World | S.R.P. Silva | Invited Speaker, presentation |
|---------------|---|---|--|-------------------------------------|
| 22-24/03/2022 | LOPEC 2022, Munich | Quantifying upscaling losses in photovoltaic modules by employing FEM simulations | S. Jenatsch, R. K. Misra, G. Koutsourakis, F. Castro, S. R. P. Silva, B. Ruhstaller | Oral presentation |
| 19-25/5/2022 | HOPV | Assessing the validity of analytical models to determine trap state pa- rameters from thermally stimulated current responses by means of drift- diffusion simulations | S. Jenatsch, Camilla Vael, Simon Züfle, Frank Nüesch, Beat Ruhstaller | Oral presentation |
| 19-25/5/2022 | HOPV | Assessment Of Photon Recycling In Perovskite Solar Cells By Fully Coupled Optoelectronic Simulation | A. Cabas Vidani, Simon Zeder, Beat Ruhstaller, Urs Aeber-hard | Oral presentation |
| 30/5-1/6/2022 | Tandem PV conference | Photon Recycling and Luminescent Coupling in All-Perovskite Tandem Solar Cells Assessed by Full Opto- Electronic Device Simulation | Urs Aeberhard, Simon Zeder, Beat Ruhstaller | Oral presentation |
| 5-10/6/2022 | IEEE PVSC | Photon Recycling and Luminescent Coupling in All-Perovskite Tandem Solar Cells Quantified by Full Opto- Electronic Device Simulation | Urs Aeberhard, Simon Zeder, Beat Ruhstaller | Oral presentation |
| 04-07/07/2022 | Nanotexnology/ISFOE | A route towards the fabrication of large-scale and high-quality perov- skite films for optoelectronic de-vices | E. Rezaee, D. Kutsarov, A. Panagiotopoulos, B. Li, J. Bi, S.R.P. Silva | Onsite poster presentation |
| 04-07/07/2022 | Nanotexnology/ISFOE | Fabrication of non-fullerene based organic solar cells with potential for flexible large-scale coating | A. Panagiotopoulos, K. D. G. I. Jayawardena, Jae Sung Yun, D. Kutsarov, S.R.P. Silva | Onsite poster presentation |
| 04-07/07/2022 | Nanotexnology/ISFOE | Organic Electronics for a Net Zero Carbon Future Sustainable Society | S.R.P. Silva | Invited Speaker, presentation |
| 05/07/2022 | 15th International Symposium on Flexible Organic Electronics (ISFOE22) | Building an industry-driven "innovation ecosystem" through the establishment of platforms for characterization | Donna Dykeman | Presentations |
| 05/07/2022 | 15th International Symposium on Flexible Organic Electronics (ISFOE22) | From MODA to executable workflows via the BPMN standard | Dario Campagna | Invited Speaker, Presentation |
| 05/07/2022 | 15th International Symposium on Flexible Organic Electronics (ISFOE22) | MUSICODE Project | E. Lidorikis | Presentations |
| 04-07/07/2022 | Nanotexnology/ISFOE | Quantitative Analysis of Upscaling Losses and Defects in Printed Solar Cells by Employing FEM Simulations | S. Jenatsch, R. K. Misra, E. L. Comi, E. Knapp, G. Koutsourakis, F. Castro, S. R. P. Silva, B. Ruhstaller | Invited Oral, presentation |
| 04-07/07/2022 | Nanotexnology/ISFOE | Cross-scale simulation method for the prediction of R2R-printing, drying, and phase separation processes in the eld of organic electronics production | A. Kneer, S.F. Kalourazi, K. Kordos, I. Skarmoutsos, K. Reimann, B. Nestler | Invited Oral Presentation |
| 04-07/07/2022 | Nanotexnology/ISFOE | Sustainable laser ablation processes for fabrication of plasmonic colloidal silver NPs to improve electrical and optical properties of printed PEDOT:PSS nanolayers | C. Kapnopoulos, S. Kassavetis, V. Heben, C. Stavraki, A. Paliagkas, E. Mekeridis, A. Laskarakis, S. Logothetidis | Oral presentation |
| 04-07/07/2022 | Nanotexnology/ISFOE | Molecular doping of fully printed flexible organic solar cells using F4- TCNQ additive | A. Paliagkas, C. Stavraki, C. Kapnopoulos, V. Heben, I. Kortidis, D. Tselekidou, C. Gravalidis, | Poster presentation |

| | | | S. Logothetidis, A. | |
|-----------------|---------------------|--|--|------------------|
| | | | Laskarakis | |
| 04-07/07/2022 | Nanotexnology/ISFOE | Fully printed ternary organic | G. Atsas, O. Heben, C. | Poster |
| | | photovoltaic devices based on | Kapnopoulos, I. Kortidis, | presentation |
| | | PPDT2FBT- PC70BM - BTP-12 system | C. Gravalidis, D. | |
| | | | Tselekidou, S. | |
| | | | Logothetidis, A. | |
| 22.26/00/2021 | IMID | Device Drusing of OLEDs and | | Invited Oral |
| 23-20/08/2021 | | Device Physics of OLEDs and Device Physics of OLEDs and | S. Jenaisch, S. Seni, C. | nvited Oral |
| | | Model Parameter Determination and | Pornstich & Zodor II | presentation |
| | | Photon Recycling | Aeberbard S Züfle B | |
| | | i noton necycling | Blülle B Bubstaller | |
| 23-26/08/2021 | IMID | Impact of self-absorption and photon | Urs Aeberhard, Simon J. | Oral |
| ,, | | recycling in metal-halide perovskite | Zeder. Balthasar Blülle. | Presentation |
| | | LEDs assessed by full opto-electronic | Beat Ruhstaller | |
| | | device simulation | | |
| 07-09/09/2022 | SIMOEP 2022 | Impact of Photon Recycling on the | Urs Aeberhard, Simon J. | Oral |
| | | Light Extraction from Metal Halide | Zeder, Balthasar Blülle, | Presentation |
| | | Perovskite LEDs | Beat Ruhstaller | |
| 07-09/09/2022 | SIMOEP 2022 | Optical Coupling of Internal Radiation | Simon Zeder, Beat | Oral |
| | | in Perovskite-Silicon Tandem Cells | Ruhstaller, Urs Aeberhard | Presentation |
| | | and Its Impact on Device | | |
| | | Characteristics | | |
| 07-09/09/2022 | SIMOEP 2022 | Multiscale modelling of charge | Elefterios LIdorikis | Invited Oral |
| | | transport in organic electronic | | Presentation |
| 22 26/08 2022 | | Towards a Not Zoro Carbon World | | Diopany |
| 22-20/08.2022 | IVICARE 2022 | through Innovation in Energy | 5.R.P. 511Va | Speaker |
| | | Materials | | nresentation |
| 17/08/2022 | Interdisciplinary | The Importance of Research in | S.R.P. Silva | Invited Speaker. |
| | research in | Nanotechnology on Sustainable | | presentation |
| | Engineering | Energy Development, | | |
| 13-16/09/2022 | ESS2022 | Flexible Electronics Designed at | S.R.P. Silva | Invited Speaker, |
| | | Nanoscale for a Future Sustainable | | presentation |
| | | Society | | |
| 18-23/09/2022 | ISMSE 15/ICPMSE 13 | Moisture and outgassing barrier for | Michal Delkowski, C. | Oral |
| | Conference | polymeric and composite materials | Smith, J. Anguita, B. Bras, | presentation |
| | | | R. <artins, erginca,="" o.="" r.<="" td=""><td></td></artins,> | |
| | | | Rampini, S. Das, S. Blake, | |
| 27-20/00/2022 | MSE congress | Phase-field simulation for the | G. COE, S.K.P. SIIVa | Onsite and |
| 27-29/09/2022 | IVISE CONGLESS | formation of porous microstructures | 3. Falzanen Kalourazi, F. Wang B Nestler | presentation |
| | | due to phase separation in polymer | Wang, D. Nestier | presentation |
| | | solutions on substrates with different | | |
| | | wettabilities | | |
| 10-12/10/2021 | 12th FPE Industry | Open Innovation Platform for | E. Lidorikis | Onsite Invited |
| | , | modelling organic electronic material | | presentation |
| | | properties, process, and devices | | |
| 10-12/10/2022 | 12th FPE Industry | Revolutionizing FPEs Manufacturing | A. Laskarakis | Onsite poster |
| | | by In-line Metrology, Quality control | | presentation |
| | | for FPEs manufacturing and Open | | |
| 10 12/10/2022 | | Innovation | D. K. Davarana | Outine insite d |
| 10-12/10/2022 | 12th FPE industry | radication of ULED's by Organic | P. K. Baumann | procentation |
| | | Technology for Display and Lighting | | presentation |
| | | Annlications | | |
| 10-12/10/2022 | 12th FPE Industry | Towards a Future Sustainable Society | S.R.P. Silva | Invited Speaker |
| 10 11, 10, 2022 | | with Flexible Electronics | | presentation |
| 25-28/10/2022 | MAT-SUS | FEM Simulation for the Quantitative | Sandra Jenatsch, Daniele | Invited Oral |
| | | Analysis of Upscaling Losses and | Braga, Ravi K. Misra, E. L. | Presentation |
| | | | Comi, E. Knapp, George | |

| | | Defects in Printed Organic and | Koutsourakis, Fernando | |
|---------------|---------------|--------------------------------------|-----------------------------|------------------|
| | | Perovskite Solar Cells | Castro, S. Ravi P. Silva, | |
| | | | Beat Ruhstaller | |
| 05-08/11/2022 | APC/IPOC 2022 | Halide Perovskites for Next | S.R.P. Silva | Invited Speaker, |
| | | Generation Flexible Opto-Electronics | | presentation |
| | | for a Green Energy Future | | |
| 21-27/11/2022 | MRS | Dimensionally and Environmentally | Michal Delkowski, C. | Oral |
| | | Ultra-stable Polymer Composites | Smith, J. Anguita, S. R. P. | Presentation |
| | | Reinforced with Carbon Fibres for | Silva, | |
| | | Extreme | | |

3.6. Participation in Networks, Clusters & Associations

1st Virtual Open Workshop Innovation 5.0: Open Translation Environment for materials and manufacturing value chains

MUSICODE Project participated at the 1st Virtual Open Workshop of the HORIZON 2020 titled "Innovation **5.0: Open Translation Environment for materials and manufacturing value chains**" which took place on March 15-16 2022, where the project was represented by Professor E.Lidorikis. More information on this workshop is provided in deliverable D5.2: "Cooperation with other EC Projects, Clusters, Networks".



Fig. 15: OntoTrans 1st Virtual Open Workshop

Furthermore, MUSICODE project took part in the International CAE Conference and Exhibition Research Agorà, a hybrid event held in Vicenza, Italy, from the 17th to the 19th of November 2021. Attendees had the opportunity to visit the MUSICODE virtual booth and access dissemination materials.



Fig. 16a: Hybrid Event - Vicenza, Italy, 17-19 November 2021.

ESTECO set up a **virtual booth** and attended the event **physically**, providing MUSICODE information, by public presentation and project's leaflet with a satisfying number of online attendees and a few online interactions. 28 visits were reached including manages and decision makers. More details about the conference can be found here: <u>http://proceedings2021.caeconference.com/index.html</u>

Moreover, following the participation to the International CAE Conference and Exhibition Research Agorà, in collaboration with UOI, ESTECO and AUTh an article on EnginSoft's newsletter (Year 19 n. 2 Summer 2022 issue) was published. The article is available here:

https://www.enginsoft.com/assets/pdf/newsletter/futurities2022_2.pdf



Open innovation platform for material modelling in organic electronics

he challenge for modelling is to enable xpeditious and accurate business decisions argefing high efficiency, performance and nanufacturability while reducing errors,

defects, resource waste, and performance variabilities.

also requires efficient design, fast uptake of new materials, and smart adaptation of

This makes the challenge even more compl and ambitious given the sheer number new candidate materials being discover every year and the multitude of processi undefine

40 Futurities - Summer 2022

cessing conditions.

MUSICODE addresses the Horizon 2020 Call number DT-NMBP-11-2020 'Open Innovation Platform for Materials Modelling' with the aim of creating a comprehensive modelling environment for materials design and processing, and device optimization in the Organic Electronics application domain. The platform integrates: modelling workflows spanning the micro-, meso- and macro-scales; graphical user interface tools for workflow design, a data management and execution framework with ontology-based semantic interoperability and plug-ins to Materials Modelling Marketplaces, the Open Translation Environment, and HPC infrastructures. Industry workflows for optimizing material properties and manufacturing will be demonstrated.

Nevertheless, this great challenge is also a great opportunity. Organic and Large Area Electronics (OLAE) do not share the same restrictions as their inorganic counterparts:

candidate materials are unlimited; process

ersity of Thessalon

ologies GmbH

Ansys ESTECO SPA Organic Electronic Technologies AIXTRON

Project No: 953187, Duration: 2021-2024, TRL: $4 \rightarrow 6$ University of Ioannina (Coordinator) Karlsruhe Institute of Technology University of Surrey can be a guide through this largely Mi unexplored terrain and become a decisive too in propelling the QLAE industry's design (apacity and productivity towards world leading applications and products.

This is the vision and objective of MUSICODE: to create an Open Innovation Platform for Materials Modelling and unleash the potential of OLAE. The project objectives are: 1. Develop novel validated multiscale modelline workflores for OLAE.

Develop novel validated multiscale modelling wolkflows for OLAE materials, processing, and devices; Develop an entology-based integrated modelling platform for workflow design, execution, data management; Cooperate with EU stateholders (European Materials Modelling

(European Materials Modelling Council, Marketplaces and High Performance Computing centers) for a complete customer offer. 4. Implementation of modelling workflows to optimize the monofecturing of associate photoesticale

manufacturing of organic photovoltaic (OPV) and organic light emitting diodes (OLED).



MUSICODE aims to create modelling workflows spanning the micro-to-macro (electronic-to-continuum) length scalaes and address specific problems related to the development and fabrication of OPV devices.

These include the effect of the material structure, photoactive blend composition, dopant concentration, and process parameters (e.g. nocile shape, temperature, ink viscosity, printing speed, substate of teatmenthy on final material properties and device performance. The chosen physics models are run hierarchically with the ought of one becoming the input for the next; returning results and key performance metrics back to be user.

Modelling scales include electronic and atomistic (Uol), messscale (XT), continuum (TinnT), and develope (Fluxin). To complet the modelling workflows, a novel workflow editor will be developed tased on the Business Process Model and Notation (BPMN 2.0) standard and ESTECO Cardanit tool.

RESEARCH & INNOVATION 3





R2R pilot line to validate the modelling workflows

The workflows will be delivered to a novel interoperability layer (CVUT:MuPIF) for execution and then to an innovative data management system (Ansys:MI) for data population and traceability.

Careful validation is key to the successful implementation of modelling, MUSICODE models will be tested with extensive experimental fabrication and the characterization of materials and devices (AUTh, USUR, Fluxim) and validated in real industrial pilot lines (DET, AUTRON).

Our goal is for MUSICODE to become the central EU open innovation platform and repository for modelling, workflows, data, and metadata in Organic Electronics.



Fig. 19b: First page of the article "Open innovation platform for material modelling in organic electronics" on EnginSoft's newsletter

8th International Conference on Simulation of Organic Electronics and Photovoltaics (SimOEP) 2022

ing materials; there are issues: there

investment issues Multi-scale modelling

musicode.eu

ENGINSOFT

In addition, to further disseminate MUSICODE activities, the partners participated at the **8th International Conference on Simulation of Organic Electronics and Photovoltaics (SimOEP)** that took place in Winterthur, Switzerland from Wednesday 7th September to Friday 9th September 2022. The partner Fluxim was involved in the organization of the event.

The **SimOEP** conference's goal is to bring together modelling experts and device physicists from industry and academia in the field of organic and perovskite solar cells as well as OLEDs. More details about the conference can be found here:

https://www.fluxim.com/events/2022/03/24/international-conference-on-simulation-of-organicelectronics-and-photovoltaics-simoep-2022



Fig. 20: International Conference on Simulation of Organic Electronics and Photovoltaics (SIMOEP 2022)

3.7. Public Media

3.7.1 MUSICODE Leaflet

The partners have prepared the MUSICODE's leaflet for the distribution to interested entities and individuals during the dissemination activities. This is available in the MUSICODE's website.





Figure 22. MUSICODE's advertising leaflet.

3.7.2 MUSICODE Posters

A series of 5 posters have been created for MUSICODE's presentation in exhibitions and other events:



Figure 23. MUSICODE's advertising and dissemination posters.

3.8 Collaboration with other projects

Regarding the networking with European Projects, Clusters and Associations MUSICODE partners applied the following actions.

MUSICODE project collaborated with VIPcoat and OpenModel projects in the framework of joint activities to exchange information, assure coherence of the EU research and avoid replication of work. An additional goal was to create synergies and new collaborations for the future.

The following joint activities were organized:

- OIP workshop withing Nanotexnology21, Thessaloniki, July 8 2021 (hybrid event)
- OIP joint meeting at 1-3rd of September 2021, Brussels (hybrid event)
- OIP Cooperation Workshop with, 17th of February 2022 (online event)
- OIP workshop within Nanotexnology22, Thessaloniki, July 5 2022 (hybrid event)
- Collaboration Workshop Open Innovation Facilitation in Horizon Europe, October 5-6, 2022, Brussels (live event)
- Position paper regarding OIP Workshop

| MUSICODE | An experimentally-validated multi-scale materials, process and device modeling & design platform enabling non-expert access to open innovation in the organic and large area electronics industry | https://musicode.eu/ |
|--------------------|--|-----------------------------------|
| VIPcoat VIPCOAT | Virtual Open Innovation Platform for Active Protective Coatings Guided by Modelling and Optimization | <u>vipcoat-oip.com</u> |
| OpenModel | Integrated Open Access Materials Modelling Innovation Platform for Europe | <u>https://open-</u> model.eu/ |

In particular, the projects that co-operated on these activities were the following:

As a result of the OIP joint meeting at 1-3rd of September 2021, a **position paper** was published summarizing the **ideas of the three Horizon 2020 projects VIPCOAT**, **MUSICODE and OpenModel**, **running under call DT-NMBP-11-2020**, with the aim to **extend the concept of Open Innovation under the Horizon Europe framework program into Open Innovation Frameworks**, compliant with the European Open Science Cloud initiatives and the European headline ambitions published by the European Commission.



Fig. 24: OIP Workshop's position paper 1st page

The **Position Paper: Open Innovation in Horizon Europe** can be found at the open repository Zenodo at the following link: <u>https://zenodo.org/record/5848552</u>

More information and detail on the above activities is included in the Deliverable 5.2 "Cooperation with other EC Projects, Clusters, Networks" of Work package 5.



Fig. 25: Photo of the participants at OIP Meeting at 1-3rd of September 2021, in Brussels (hybrid event).

Fig. 26: Logo of Open Innovation in Horizon Europe Workshop

Participation of MUSICODE partners to other Projects

Several of the MUSICODE partners participate in other large H2020 projects concerning the modelling, characterization and fabrication of flexbile Organic Electronics, OPVs and OLEDs and biosensors:

- FlexFunction2Sustain (2020-2024) that aims to build an OITB to boost innovation for nanofunctionalised flexible plastic and paper surfaces and membranes in EU's SME and Industrial ecosystems. OET's main role in the project is:
 - Participation in Open Innovation Test Bed
 - Up-scaling of R2R manufacturing process

 Participation in facility 4: S2S and R2R printed electronics processing and demonstration of R2R process in a use-case concerning printed sensors on flexible substrates for automotive interior. (AUTh, OET)

Fig. 27. Consortium partners of FlexFunction2Sustain

- NanoMECommons (2021-2025) that will engage Open Innovation activities through the harmonisation of micro and nanoscale mechanical characterization and the development of novel multi-technique protocols for specific industries (e.g. automotive, avionics, organic electronics). OET's main role in the project is:
 - Development of multi-technique characterization protocols (optical, electrical, nanomechanical) for Organic Electronic applications
 - R2R manufacturing of OPV and OLED devices and in-situ & ex-situ electrical, in-situ optical, structural and mechanical characterization
 - Fabrication of high-efficient OPV and OLED devices with improved mechanical performance and stability

(AUTh, OET, ANSYS)

RealNano (2020-2023) that will develop novel and fast real-time nano-characterization materials tools
 & methodologies based on Spectroscopic Ellipsometry, Raman Spectroscopy, Imaging
 Photoluminescence and Laser Beam Induced Current Mapping that will be integrated to in-line R2R
 (Roll-to-Roll) Printing and OVPD (Organic Vapor Phase Deposition) Pilot-to-Production Lines (PPLs) for
 characterization of Organic & Printed Electronics (OE) nanolayers, devices & products during their
 manufacturing.

(AUTh, OET, AIXTRON/APEVA, ANSYS).

3.9 Internal Communication Activities

The members of MUSICODE organize a Consortium Meeting that takes place every 6 months to meet and discuss about the project innovations, arrangements, potential challenges, and collaborative actions to reach its ambitious targets. The following Consortium meetings took place until Month 24.

Kick-off M1 Consortium Meeting, 21 January 2021, Virtually

The Kick-Off Meeting of the MUSICODE project took place online on 21 January 2021, with the virtual participation via the MSTeams Platform of representatives from all partners and the EU Project Officer Sanfelix Javier.

During the meeting all project partners and its administration were introduced. One of the main targets of the meeting was to present and discuss in depth the project objectives, the workplan and the next steps for the first 6 months, as well as the next Technical Meetings and the work for the preparation of the first deliverables of the project.

Fig. 28: MUSICODE Kick-Off Consortium Meeting on 21 January 2021

MUSICODE M6 Consortium Meeting, 2 July 2021, Thessaloniki

The M6 Consortium meeting of the MUSICODE Horizon 2020 Project took place live on 02-07-2021, in a hybrid event at Porto Palace Hotel in Thessaloniki, Greece. During this meeting, in which all project partners participated either Live or Virtual, the progress of the planned activities during the last semester as well as the next steps were presented.

Fig. 29: Photo of the project partners after the end of the M6 Consortium Meeting

MUSICODE M12 Consortium Meeting, 27 January 2022, Virtually

The M12 Consortium meeting of the MUSICODE project took place virtually via the MS Teams Platform on 27th of January 2022. The main objectives of the M12 Meeting were to present the achievements of the period M7-M12 towards project objectives and discuss in depth the progress so far, the submitted and upcoming deliverables, identified deviations from the general workplan, the realized/foreseen risks and mitigation actions, as well as the next steps for the period M13-M18 in view of the M18 review meeting.

Fig. 30: Photos of the project partners after the end of the M12 Consortium Meeting

In addition, partners participated in dedicated technical telco meetings, regarding workpackages' activities, such as WP3 monthly meetings and the population of database with MCP results etc.

The WP2, WP3 and WP4 meetings have been each taking place on a monthly, or even biweekly (WP4), basis. Sometimes, extra meetings were arranged to discuss urgent matters such as: fabrication of samples, postage

of samples for further characterization by partners, discussion and planning of further experimental work that needs undertaking for a successful completion of the tasks.

MUSICODE M18 Consortium Meeting, 2 July 2022, Thessaloniki

MUSICODE's M18 review meeting took place at Porto Palace Hotel located at Thessaloniki, Greece on July 2nd, 2022. Those who did not attend the meeting physically, could participate through the MS Teams virtual platform.

Fig. 31: Photos of the project partners after the end of the M18 Consortium Meeting

During the meeting the context and overall objectives of the project were presented as well as the work performed from the beginning of the project to the end of the period covered by the report and the main results achieved so far. Moreover, progress beyond the state of the art, expected results until the end of the project and potential impacts were discussed.

4. Final Dissemination Statistics

Below you can find an overview of the MUSICODE dissemination and communication activities that took place in the period M1-M24. The organization of hybrid (live & virtual) events gave the opportunity to all partners to participate in many conferences and exhibitions during the 2021 and 2022.

Fig. 32: Dissemination activities of MUSICODE members during the period M1-M24.