

D3.5 – Seminars provided through the web portal (1st report)

WP3 NA2 – Dissemination /
Communication activities, and
Exploitation Strategy



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List of abbreviations

ALMA - AlmaScience

HMU – Hellenic Mediterranean University

ICN2 – Institut Català de Nanociència I Nanotecnologia

MCL – Materials Center Leoben Forschung GmbH

RISE – Research Institutes of Sweden AB

SMEs – Small-medium enterprises

TLO – Technical Liaison Office

UNOVA – Instituto de Desenvolvimento de Novas Tecnologias - UNINOVA

WP – Work package

WUT – Warsaw University of Technology

CONTENTS

Document information.....	ii
List of abbreviations.....	iii
List of Figures	v
List of Tables	v
1. Executive Summary.....	1
2. Overview of the virtual seminars and activities.....	2
2.1. Seminars.....	2
2.1.1. <i>Nanomaterials Webinar Sustainable Synthesis of Oxides for Electronics, Photocatalysis and Energy Applications</i>	2
2.1.2. <i>1st EMERGE School Online Seminars</i>	5
2.2. Educational videos.....	7

List of Figures

Figure 1 – Screenshots from the joint seminar promoted by UNOVA and MDPI.....	3
Figure 2 – Example of seminars prepared by the experts for the EMERGE School (2023 edition) .	7
Figure 3 - EMERGE educational and training videos.....	8

List of Tables

Table 1 – Program of the joint seminar promoted by UNOVA and MDPI.....	3
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1. Executive Summary

The deliverable **D3.5 - Seminars provided through the web portal** is part of WP3 – NA2 – Dissemination/ Communication activities and Exploitation Strategy. This document aims to overview the virtual seminars and activities organised by EMERGE. These events are aimed at various stakeholders, primarily focusing on early-stage researchers, including master's and PhD students, engineers, and research staff within the consortium, but are also open to external audiences.

Until M24, the EMERGE consortium participated in two main types of virtual events: those prepared within the project framework and those where the project outputs and scope were disseminated. This was done by organising a webinar and set of online presentations serving as preparation for the EMERGE Summer School.

This deliverable is a live document that will be updated throughout the project (expected updates in M36 with D3.6 and in M48 with D3.7).

2. Overview of the virtual seminars and activities

The seminars aimed to be virtually disseminated are aligned with the scope of *Subtask 2.4.2 - Increase number of trained European researchers and technologists by assembling specialised courses* (part of Task 2.4- Training and mobility program)

The sub-task aims to enhance the scientific and technical know-how and skills of the researchers in traditional electronics and photonics who are interested in gaining new skills in emerging technologies and their applications. This objective can be accomplished through training offered via secondments, virtual seminars, and educational videos.

In addition to the seminars prepared until M24, this deliverable briefly compiles the educational videos (further information can be accessed in deliverable *D2.8 — Educational videos*) and seminars prepared until M24.

2.1. Seminars

2.1.1. *Nanomaterials Webinar | Sustainable Synthesis of Oxides for Electronics, Photocatalysis and Energy Applications*

A webinar on "Sustainable Synthesis of Oxides for Electronics, Photocatalysis, and Energy Applications" was organised on 1 March 2023.

(<https://sciforum.net/event/nanomaterials-11?subscribe§ion=#introduction>).



The seminar was organised by MDPI, and the Journal Topics session was led by Professor Rodrigo Martins (UNOVA and EMERGE project coordinator). The three-hour session included presentations from Prof. Rita Branquinho, Prof. Daniela Gomes, and Dr. Emanuel Carlos. The three researchers from UNOVA presented their findings on metal oxide research, covering subjects such as solution combustion synthesis, sustainable metal oxide nanomaterials produced using hydro/solvothermal methods for multifunctional applications, and printed metal oxide thin film devices. These presentations were followed by a Q&A and a discussion moderated by Prof. Rodrigo Martins.

The seminar was not only focused on scientific content but also provided an excellent opportunity to introduce EMERGE and promote the opportunities available through the project to the attendees. Below, you can find the program and some screenshots from the

event. For the complete seminar recording on youtube, please follow the link:
https://youtu.be/omoJ_20lu8M?si=HJB99TOWdyBBvfw8

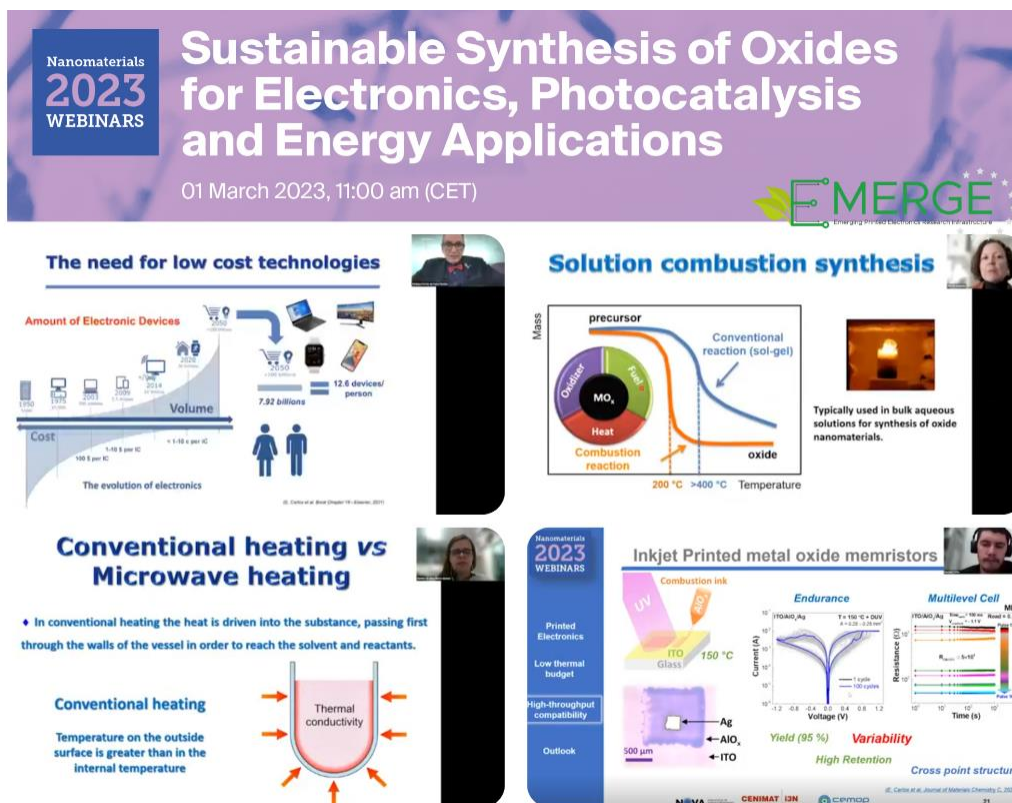


Figure 1 – Screenshots from the joint seminar promoted by UNOVA and MDPI.

Table 1 – Program of the joint seminar promoted by UNOVA and MDPI.

Program: Nanomaterials Webinar Sustainable Synthesis of Oxides for Electronics, Photocatalysis and Energy Applications	
Speaker/Presentation	Time in CET
Prof. Dr. Rodrigo Ferrão de Paiva Martins	11:00 - 11:15 am
Chair Introduction	
Dr. Rita Branquinho	11:15 - 11:40 am
Solution Combustion Synthesis: Towards a Sustainable Approach for Metal Oxides	
Dr. Daniela da Silva Nunes Gomes	11:40 am - 12:05 pm
Sustainable Metal Oxide Nanomaterials Produced Using Hydro/Solvothermal Methods for Multifunctional Applications	
Dr. Emanuel Carlos	12:05 - 12:30 pm
Printed Metal Oxide Thin Film Devices	
Q&A Session	12:30 - 12:55 pm
Closing of Webinar	
Prof. Dr. Rodrigo Ferrão de Paiva Martins	12:55 - 1:00 pm

Speakers' short bio

Prof Rodrigo Martins is a full professor in the Materials Science Department of the Faculty of Science and Technology of the New University of Lisbon, a Fellow of the Portuguese Engineering Academy since 2009 and a member of the European Academy of Science since 2016. He was decorated with the gold medal of merit and distinction by the Almada Municipality for his R&D achievements. Among several positions, currently he is the Director of the Centre of Excellence in Microelectronics and Optoelectronics Processes of the Institute of New Technologies, CEMOP/Uninova; Head of the group of Materials for Electronics, Optoelectronics and Nanotechnologies (MEON) of CENIMAT/I3N; President of the European Academy of Sciences; Member of the Advisory Board of Horizon 2020 on DG Research and Innovation (Advanced Materials, Nanotechnology, Biotechnology and Manufacturing, to name a few. Rodrigo Martins has been a pioneer in European research on amorphous silicon semiconductors. He pioneered his group's worldwide activity related to passive and active oxides, the so-called transparent electronics. It is one of the inventors of the so-called paper electronics, where paper is exploited not only as a substrate but also as a functional component in active devices. Martins has published over 700 papers and, during the last 10 years, has received more than 14 international and national prizes and distinctions for his work.

Rita Branquinho is an Assistant Professor at the Department of Materials Science of the NOVA University of Lisbon, Portugal. She holds a degree in Chemistry and a Ph.D. in Nanotechnologies and Nanosciences. She has focused her research on the development and characterisation of oxide nanomaterials, ink formulation and characterisation and solution-based deposition routes for devices for electronic and sensor applications. Her current research interests include developing and characterising solution-based oxide materials and nanostructures (including dielectric, semi-conductive and conductive oxides) using low-temperature solution combustion synthesis for applications in printable transparent electronics.

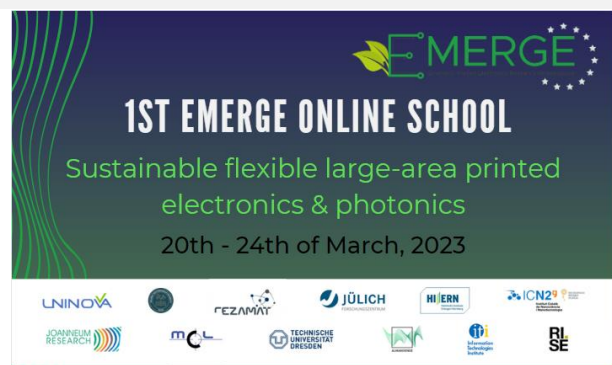
Daniela Gomes received her PhD from Instituto Superior Técnico in 2012 in Materials Engineering, with the dissertation "Carbon dispersions in nanostructured metals". She became a Post-doctoral researcher at the CENIMAT/i3N of NOVA School of Science and Technology in 2013. The post-doctoral work was entitled "Design of new functional materials

for electronics applications". Since October 2015, she has been an Assistant Professor at the Materials Science Department of NOVA School of Science and Technology. She is responsible for the electron microscopy laboratories of CENIMAT and the recently installed STEM microscope. She has focused her research on producing metal oxide nanomaterials and their structural characterisation using electron microscopy techniques. Her current research interests include developing and characterising metal oxide nanostructures produced using a hydrothermal method assisted by microwave irradiation for applications in sensors and photocatalysis.

Emanuel Carlos is a Researcher at CENIMAT|i3N and co-PI of two exploratory projects, SUPREME-IT and GAMBIT, through FCT funding. He finished his PhD 2021 in Nanotechnology and Nanoscience at NOVA University Lisbon. He has been working in solution-based metal oxide electronics since 2015, focusing on sustainable materials and technologies for printed electronics. His work involves the design, deposition, and characterisation of solution-based metal oxide thin films and the fabrication and characterisation of electronic devices (transistors, memristors, diodes, among others) on flexible substrates. He has been participating in national and international research projects in the area, both in academia and industry.

2.1.2. 1st EMERGE School | Online Seminars

The 1st EMERGE school was organised and led by HMU and divided into two main parts: the online seminars (20-24 March 2023) and the on-site training session in HMU in September 2023. This school's target audience was primarily PhD students and early-stage researchers.



On the first day of the online school, we received a presentation about the project objectives and opportunities. It discussed how the project could incorporate ideas from academia into industry for flexible large-area printed electronics and photonics. The scientific and technical sessions included presentations from well-known researchers covering various topics related to the project's transnational activities (TAs).

These seminars addressed the four main aspects of the project, which are described below:

2nd day: TA1 - Design, modelling and simulation:

- Understanding the process–structure relation in solution-processed thin films with the help of phase-field simulation: **Dr Olivier Ronsin (FZJ)**
- Optical simulation of free-form micro-optical elements: **Dr. Christian Sommer / DI Wolfgang Nemitz (JOR)**
- Modeling of organic electrochemical transistors: **Dr Hans Kleemann (TUD)**
- Modelling TFT degradation through chemical reactions in device simulations: **Dr Ahmed Nejim (SILVACO)**

3rd day: TA2 - Material synthesis and characterization:

- Emerging 2D materials synthesis via wet chemistry: **Dr Ali Shaygan Nia (TUD)**
- Ion-based devices and systems: fabrication and verification: **Dr Peter Andersson Ersman (RISE)**
- Solution-combustion synthesis of oxide thin films: **Prof. Rita Branquinho (UNINOVA)**
- Reinventing electronics for a sustainable world: **Mr Julio Costa (Pragmatic)**

4th day: TA3 – Prototype fabrication

- Challenges in scaling up printed carbon composites: **Dr Andrzej Peplowski (WUT)**
- Printed mechanical sensors on paper and cork: **Drs Sumita Goswami and Andreia Santos (ALMA)**
- Inkjet-printed biosensors based on flexible substrates for biomedical applications: **Dr Giulio Rosati (ICN2)**
- Novel pathways for large area electronics using solution-processable chemical derivatives of graphene: **Dr C. Mattevi (ICL)**

5th day: TA4 - Demonstrator characterization and validation

- Proper methodologies for characterisation of inks/pastes of different organic/inorganic materials: **Dr Mats Sandberg (RISE)**
- Raman technology and related issues: **Dr Barbara Kosednar-Legenstein (MCL)**
- High Throughput Production of Printed Photovoltaics: **Dr Hans-Joachim Egelhaaf (FZJ)**
- Industrial roll-to-roll production of organic indoor solar cells: **Dr Thomas Österberg (Epishine)**

Registration was required for school and seminar participation, with nearly 200 people signing up and 149 attending the talks. Participants accessed materials through the Moodle platform, where recorded video seminars and corresponding slides were uploaded. The D2.5 1st Report on the EMERGE Schools describes the school's content, speakers,

abstracts, and participants in detail. Further information can be consulted on the respective document.

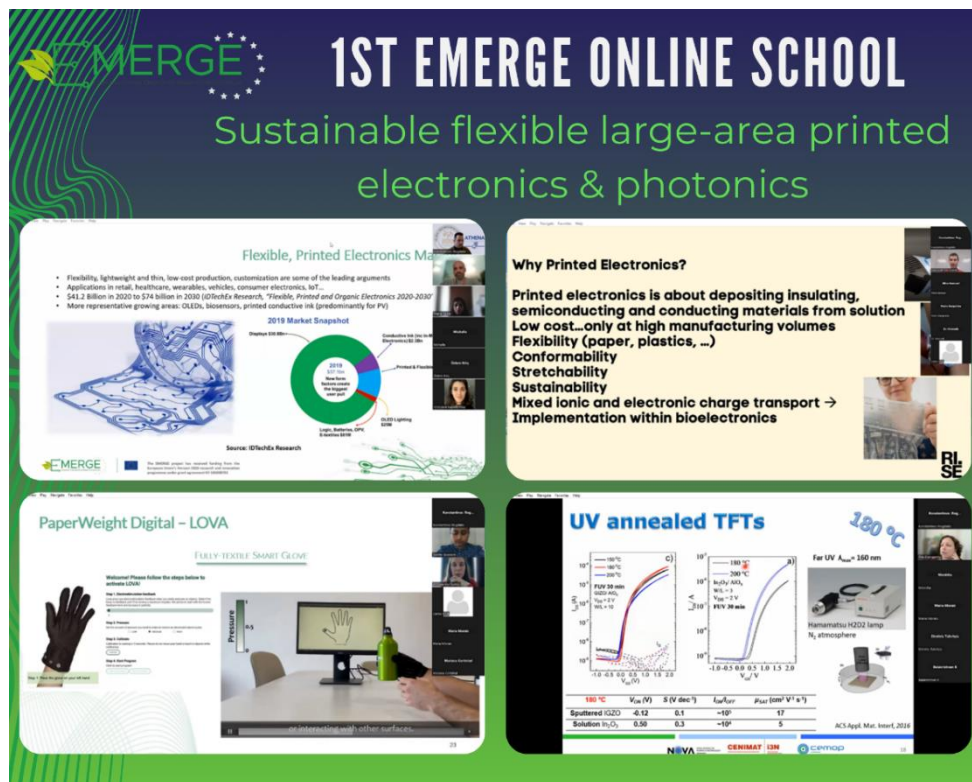


Figure 2 – Example of seminars prepared by the experts for the EMERGE School (2023 edition).

2.2. Educational videos

Due to the educational nature of the task which feeds this document, this short section summarises the videos prepared to be used as training and supporting material.

Until M24, the consortium created educational videos that will soon be accessible on the EMERGE website. The initial batch of videos provided by RISE and JOR covered the operational principles of various techniques within the EMERGE infrastructure. These techniques are available to users for project development across different technical areas (TAs) and for internal projects related to joint research activities within the consortium.

The UNOVA infrastructure provides a range of fabrication techniques and expertise for electronic and photonic devices. The partner has created videos demonstrating processes such as "creating self-healing iontronic devices from cellulose" and "fabricating recyclable electronic devices and materials from cellulose." Some of these videos are intended for educational purposes, while others highlight the technology, methods, and printing facilities that UNOVA offers to EMERGE users.

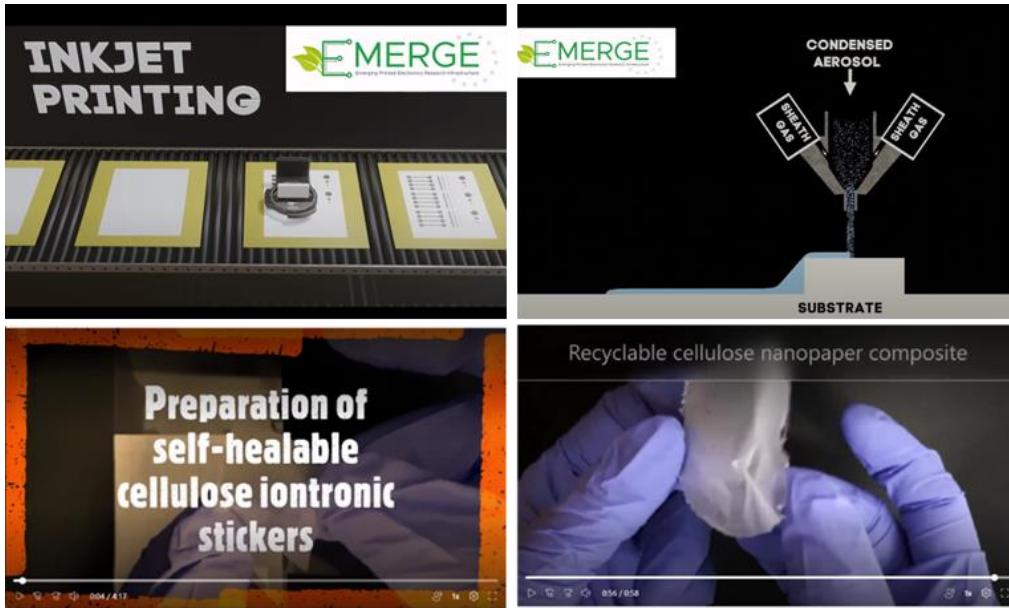


Figure 3 - EMERGE educational and training videos.