



D7.8 TECHNICAL WORKSHOP SUMMARY (T7.3)

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1 WORKSHOP OVERVIEW

1.1 European Microwave Week

The European Microwave Week (EuMW) started in The Netherlands in 1998. The European Microwave Week 2019 took place in Paris, France. Bringing industry and academia together, European Microwave Week 2019 is a six day event, including THREE cutting edge conferences, two Forums and one trade and technology Exhibition featuring leading players from across the globe.

The 22nd European Microwave Week combines:

- Three Major Conferences
- Two Forums
- **Associated Workshops**
- Tailored Courses and Seminars for industrialists, academics and researchers
- Leading International Trade Show
- Exhibitor Workshops and Seminars will be provided by several top organisations with superior expertise in Microwave, RF, Wireless or Radar

More than 25 workshops and short courses, on a variety of popular topics of current or emerging interests, have been organised during EuMW 2019.

1.2 Workshop presentation

A full day (time: 08:30 – 17:50) workshop (WS-03) has been organized on Sunday 29 September 2019 in the frame of MMAMA project. The title was “Microwave Characterization and Modelling at Nano and Micro-Scale of Advanced Materials to Enhance Emerging Products Manufacturing”. The Chairs were Kamel Haddadi from University of Lille and Johannes Hoffmann from METAS.

The abstract is given below:

On one hand, Manufacturing industry offers a large range of organic and inorganic based materials addressing numerous applications. The quality and performance of the final manufactured products depend strongly on their chemical/electrical/optical/mechanical properties at nanoscale as well as their arrangements at macroscale (amorphous, partially isomorph, hybrid/composite, multi-layered). On the other hand, microwave to mm-wave non-destructive testing and evaluation methods are well established for determining electrical properties of materials. A variety of methods including far to near field free-space, guided, resonant and scanning probe microscopy offers numerous solutions for Macro down to Nano scale characterization. In this context, the objective of this workshop is oriented towards RF to mm-wave techniques and related instruments dedicated to non-destructive evaluation applicable to wide range of emerging materials. This workshop is proposed in the frame of the H2020-NMBP-07-2017 MMAMA “Microwave Microscopy for Advanced and Efficient Materials Analysis and production” (www.mmama.eu).



1.3 Programme

The program included 10 speakers, with four external from MMAMA. The list of the speakers and abstracts are summarized below. The workshop began by a presentation of the MMAMA project by Johannes Hoffmann.

8h40 – 9h00

Johannes Hoffmann
METAS (Switzerland)
H2020-NMBP-07-2017 MMAMA “Microwave Microscopy for Advanced and Efficient Materials Analysis and production” (www.mmama.eu).

9h00 – 9h40

¹Olivier Douhéret, ¹David Moerman, ²Didier Théron
Materia Nova R&D Center (Belgium), IEMN CNRS UMR-8520 (France)
Study of electrical properties of organic semiconductors and photovoltaic nanostructures using microwave characterization methods

9h40 – 10h20

¹Arif Gungor, ²M. Celuch, ¹J. Smajic, ²M. Olszewska-Placha, ¹J. Leuthold
¹Institute of Electromagnetic Fields (IEF), ETH Zurich (Switzerland)
²QWED Sp.z o.o (Poland)
Time-domain Coupled Maxwell- and Drift-diffusion-solver for Simulating Scanning Microwave Microscopy of Semiconductors

10h40 – 11h20

Christoph Baer
Institute of Electronic Circuits, Ruhr University Bochum (Germany)
Synthesis, Verification and Reproducibility of Microwave Design Materials

11h20 – 12h00

Georg Gramse, Ferry Kienberger
Keysight Labs (Austria)
Wideband Electrostatic Force Microscopy (EFM): Broad Frequency Range with High Sensitivity

13h30 – 14h10

J. Hoffmann, Toai LeQuang, Denis Vasyukov, Markus Zeier
RF& Microwave Lab, Federal Institute of Metrology METAS (Switzerland)
Tips and Calibration of Nearfield Scanning Microwave Microscopes

14h10 – 14h50

G. Fabi, E. Pavoni, L. Pierantoni, D. Mencarelli, A. Di Donato, M. Farina
Università Politecnica delle Marche, Ancona (Italy)
Recent advances of scanning microwave microscopy and the inverted microscopy

14h50 – 15h30

Zahra Nemati, Jinfeng Li, Peter Burke
University of California Irvine (United States)



Integrated Fluorescence and Scanning Microwave Microscopy: Nano-Imaging with GHz on System With “Proof of Life

15h50 – 16h30

¹Petr Polovodov, ²Didier Theron, ¹Gilles Dambrine, ¹Kamel Haddadi

¹University of Lille, CNRS / IEMN (France), ²CNRS / IEMN (France)

Combined Atomic, Microwave and Electron Microscope: A tool for Hybrid Characterization of Nanomaterials

16h30 – 17h10

Malgorzata Celuch, A. Wieckowski, W. Gwarek, J. Rudnicki, M. Olszewska-Placha, M. Sypniewski, J. Krupka

QWED Sp.z o.o (Poland)

Dielectric resonator scanning of wafer -size surfaces at finer -than -head resolution

17h10 – 17h50

Alireza Kazemipour, J. Hoffmann, M. Wollensack, G. Gaumann, M. Zeier

Federal Institute of Metrology - METAS, (Switzerland)

Quasi free space (TEM) material measurements

2 PERSPECTIVES AND ILLUSTRATIONS

2.1 Discussion and feedback

The audience gathers around 15 registered attendees, which is consistent with other workshops audience. In particular, interactions between the participants were strong, as we had well recognized international experts in the field of both nanoscale and macroscale microwave sensing techniques.

In the field of near-field scanning microwave microscopy, Prof. Luca Pierantoni, from Università Politecnica delle Marche (UNIVPM) and member of the IEEE TC-25 RF Nanotechnology, stakeholder of MMAMA project, represented during the workshop by his colleague G. Fabi, send us his congratulations. The perspectives of this workshop will be discussed during the next IEEE TC-25 RF Nanotechnology meeting held during IMS 2020 in LA, US with encouragements to “build the SMM (Scanning Microwave Microscopy) community” with regular interactions.

Prof. Peter Burke from University of California Irvine (UCI), member of the IEEE TC-25 RF Nanotechnology and stakeholder of MMAMA project has delivered a talk around scanning microwave microscopy applied to imaging of living cells. Peter burke has highlighted the research performed in the frame of MMAMA and its interest for the scientific and industrial communities. In particular, the open innovation environment developed within MMAMA is of great interest to share experience with academic and industrial partners and to facilitate the penetration of SMM technology for both academic and industrial applications.



In the field of macroscale characterization, Dr Christoph Baer from the Institute of Electronic Circuits, Ruhr University Bochum (Germany) and Dr Alireza Kazemipour from METAS deliver talks around free-space quantitative microwave sensing. Both speakers agree to pursue the interactions in the frame of free-space sensing developed within MMAMA (integration of a monostatic free-space microwave technology in the ADAMANT pilot line).

2.2 Photos



Professor Burke presents at EUMW in Paris, France, October 2, 2019
Professor Burke presented the group's latest findings



Prof. Peter Burke (UC Irvine), and Prof. Henri Happy, Dr Kamel Haddadi, and Dr Didier Theron (University of Lille, IEMN, Lille, France) at EUMW in Paris, France, 2019.