TTS, s.r.o.

Participation of the non-academic sector in MSCA

Ing. Zuzana Kapounová, Ph.D.

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INTRODUCTION

- TTS – a small Czech technological company
- Beneficiary partner in ITN/DN project Magnetoelectrics Beyond 2020: A Training Programme on Energy-Efficient Magnetoelectric Nanomaterials for Advanced Information and Healthcare Technologies' — 'BeMAGIC'
- Host of one early-stage researcher (ESR)

TTS personel participating in the ITN project

- **Ing. Lenka Mikuličková** (scientist-in-charge)
- **RNDr. Jaroslav Merta** (co-supervisor)
- **MSc. Eleftherios Niapos** (ESR)

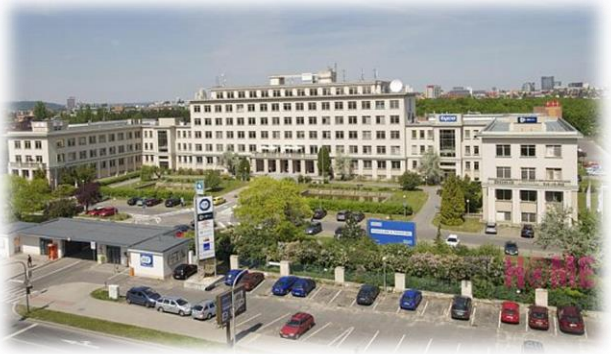
Ing. Mikuličková and RNDr. Merta send their regards. They would like to participate, but unfortunatelly have other professional duties today.

ABOUT TTS

- A small Czech private company founded in 1992, located in Prague
- Background in the R&D for the electronic industry (thin film components)
- Specialists in thin film design, development and manufacturing up to a small scale serial production
- *Other activities: Dew point sensors development and production, radiation analysis*

Thin film products

- Thin film metallization and custom-made thin films
  - Solderable metallization, optical coatings, coating for composite materials
- Thin film components (dew point sensors)



Technologies

- Magnetron sputtering (DC and RF)
- Ion beam sputtering
- RF sputter cleaning and ion etching
- Photolithography
- Wet processes (etching, anodization)

ABOUT THE BeMAGIC PROJECT

BeMAGIC is a joint academic-industrial inter-disciplinary initiative which has the primary goal of training a pool of young researchers in the research and utilization of magnetoelectric (ME) nanomaterials

- Project coordinator: Universitat Autònoma de Barcelona – Department of Physics (scientist-in-charge: Prof. Jordi Sort)
- Project consortium: 13 beneficiaries and 11 partner organisations
- Project duration: 2019 - 2023

The project is exploring magnetoelectrics with focus on their use to face following challenges:

- **Minimizing energy consumption of data storage electronic devices –** voltage instead of current controlled memories
- **Protecting digital data against security threats** - memories that can be switched ON-OFF
- **Replacing invasive anti-cancer and neurological threatments by wireless stimulation** – local and targeted drug release, wireless deep neural stimulation triggered by magnetoelectricity

ABOUT THE BeMAGIC PROJECT

PROJECT CONSORTIUM

Beneficiaries

Consortium Member	Legal Entity Short Name	Academic	Non-academic	Awards Doctoral Degrees	Country
Universitat Autònoma de Barcelona (Coordinator)	UAB	x		x	Spain
Consiglio Nazionale delle Ricerche	CNR	x			Italy
University of Cambridge	UCAM	x		x	United Kingdom
Istituto Nazionale di Ricerca Metrologica	INRIM	x			Italy
Aalto Korkeakoulusaatio SR	AALTO	x		x	Finland
Karlsruher Institut für Technologie	KIT	x		x	Germany
Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden e.V.	IFW	x			Germany
Eidgenössische Technische Hochschule Zürich	ETHZ	x		x	Switzerland
Fundació Institut Català de Nanociència i Nanotecnologia	ICN2	x			Spain
Voxalytic GmbH	VOXALYTIC		x		Germany
Guger Technologies Medical Engineering OG	G.TEC		x		Austria
Spin-Ion Technologies	SPIN-ION		x		France
Thin Film Technological Service s.r.o.	TTS		x		Czech Republic

Partner organisations

Consortium Member	Legal Entity Short Name	Academic	Non-academic	Awards Doctoral Degrees	Country
Jozef Stefan Institut	JSI	x			Slovenia
Università degli Studi di Torino	UNITO	x		x	Italy
Technische Universität Dresden	TUD	x		x	Germany
Instituto Nacional de Engenharia Biomédica	INEB	x			Portugal
Johannes Kepler University of Linz	JKU	x		x	Austria
Université Paris-Saclay	UPSAC	x		x	France
Brno University of Technology	BUT	x		x	Czech Republic
Magnes AG	MAGNES		x		Switzerland
Durham Magneto Optics Ltd	DMO		x		United Kingdom
Singulus Technologies AG	SINGULUS		x		Germany
ThePaperMill	TPM		x		Spain

ROLE OF TTS IN THE BeMAGIC PROJECT

- Beneficiary partner
- Host of the ESR15 (co-supervised by BUT – prof. Ladislav Čelko, mentored by UAB)
- Host of other ESRs for seconments

ESR15 project: Up-scaling of the growth of metal/oxide bilayer systems for non-volatile magnetoelectric effects: magneto-ionics and ferroelectric/feromagnetic heterostructured multiferroics

- **Targeted systems**: Ni / $BaTiO_3$ (artificial heterostructured multiferroic) and Ni /HfO_2 (magneto-ionic system)
- **Objectives**:
  - Optimization of deposition conditions for targeted systems at wafer level
  - Comparative study of ME effects in continuous films and lithographed patterns
- **Targeted system properties**:
  - Stable (non-volatile) voltage controlled effects (ON-OFF ferromagnetism, changes of coercivity, easy axis reorientation)
- **Expected use of developed systems:** anti-hacking security devices

PARTICIPATION OF TTS IN THE BeMAGIC PROJECT

Our road to the consortium

- BeMagic is our first ITN project
- We were approached by the project coordinator with whom we hadn‘t had any previous contact during proposal writing phase
- We were identified to be a suitable partner thanks to our professional reasons (specialization in thin film deposition), but also other reasons (location, gender balance)
- The project coordinator also found us the partner organisation awarding Ph.D. to our ESR – Brno University of Technology (Research group High Performance Materials and Coatings for Industry – leader prof. Ladislav Čelko)

PARTICIPATION OF TTS IN THE BeMAGIC PROJECT

Challenges of our participation in BeMagic

COVID

- start of the project – 09/2019
- 1st ESR from 03/2020 – ended the cooperation
- 2nd ESR from 01/2021 – loss of one year
- Much less networking oportunities (online workshops and no secondments for first two years)

TECHNICAL CHALLENGES

- Some equipment at BUT is more suitable for the ESR‘s research than our equipment – bigger portion of research than originally expected is performed at the university

BENEFITS OF PARTICIPATION IN AN ITN PROJECT

Our motivation to join the consortium, expected benefits and their fullfilment

- **Work on a new, attractive topic much closer to basic research than we are used to**
  - FULFILLED
- **Gaining new contacts in the scientific community**
  - Despite of COVID definitelly fulfilled
  - With part of the consortium we organized another ITN/DN proposal that is now being evaluated (Dr. Kapounová co-supervisor)
  - With BUT group of prof. Čelko we started cooperation on other R&D projects
- **ESR as a reinforcement of our R&D team**
  - *Theory:* ESR = fully funded full-time researcher
  - *Reality:* Majority of the ESR working time is devoted to the ITN project and Ph.D. study
  - Significant probability of loosing the ESR after the end of the project / finishing his Ph.D. (looking for job closer to home, payment conditions equal or better that at the ITN – ESR is the best payed memeber of the team during the ITN, etc.)

SUMMARY

- **Participation in the ITN/DN project is challenging, but definitelly positive experience**
- **The best evidence of our appreciation of ITN/DN programme – joining another ITN consortium**

Thank you for your attention