

Twinning to excel materials engineering for medical devices ExcellMater

Coordination and Support Action – H2020-WIDESPREAD-2020-5 – ExcellMater

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Twinning Project Days, March 24-25, 2021





Project objective:

to advance the research and innovation capacity of the Faculty of Technology and Metallurgy (FTM), University of Belgrade, in the area of biomaterials engineering by collaboration with leading international institutions:

- AALTO Aalto University Foundation, Finland
- UPO University of Eastern Piedmont "A. Avogadro", Italy
- ARI AO Research Institute Davos, Switzerland

Start date: November 1, 2020 Duration: 36 months Budget: € ~880 K



Biomaterials research at FTM towards specific biomedical applications

Materials					
	Composites				
Inorganic: Hydroxyapatite β-Tricalcium phosphate Bioglasses (BAG)	Co/BAG	Production methods			
	Alginate/β-TCP	Microwave sintering	Physico-chemical characterization	Biological	
	GG/BAG			characterization	Dental materials
Polymers: Alginate Gellan gum PVA Lignin Chitosan PHEA NiPAAm PVB PEG PCL	HAp/chitosan/graphene	Hydrothermal synthesis	FE-SEM	Antimicrobial studies (limited to several standard strains) Cytotoxicity (limited to one cell type)	Orthopaedic
	, in the state of		EDS		implants
	Ag/HAp/Lignin coatings	NP synthesis by precipitation	XRD		C ırtilage tissue eng
	Keratin/PEO/graphene	Electrochemical synthesis	FTIR		Bone tissue eng
	Ag/alginate	Gamma irradiation	ТЕМ		
	Ag/PVA	Thermal crosslinking	Nanoindentation		Bioactive
	PVB/titanium	UV photopolymerization	Mechanical		wound dressings
Active agents: AgNPs, CuNPs Povidone iodine α-lipoic acid Oxaprozin Thymol Cu ²⁺ , Zn ²⁺ , Sr ²⁺ , Mg ²⁺ , Co ²⁺ Keratin Carvedilol Cefazolin	Carvedilol/PEG	Emulsion crossinking	ICP		Internal
	Cu/hydroxyethyl acrylate/ itaconic acid	Electrospinning	AAS		wound treatment
		Electrostatic droplet generation	DSC		Drug delivery
	Oxaprozin / PHEA/itaconic acid)		Bioreactor studies		
	Cefazolin/PCL				
	Alginate/activated charcoal with PVP-I				





Pathway for translation of biomedical research to healthcare: the first gap - translation of basic and clinical research into products the second gap - introducing those products into clinical practice

FTM has ~37 patents and patent applications in different fields, **none of them has been licensed or sold to industry**

Cooksey D., A review of UK health research funding. 2006





- Institute for Biological Research "Siniša Stanković"
- Institute for Molecular Genetics and Genetic Engineering
- Faculty of Pharmacy
- School of Medicine
- INEP
- Innovation Center of the Faculty of Technology and Metallurgy
- Business Technology Incubator
- Science Technology Park Belgrade

Lack of relevant knowledge and expertise





- **biological evaluation of biomaterials** immunology, bacteriology, genetics, etc., systems biology, biosignals (UPO)
- tissue engineering, biomaterials, biomechanics, support systems, implants (ARI)
- prosthetics, medical devices design, certification (AALTO, ARI)
- IPR protection, licensing, start ups, technology innovation strategies (AALTO)
- health technology assessment/evaluation (UPO, AALTO, ARI)
- project proposal preparation, project management and administration (AALTO, ARI, UPO)



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- FTM:
 - Advanced Biocomposite Materials Group
 - Bioceramic Materials Group
 - Bioencapsulation Research Group
 - Biomedical Engineering Group
 - Electrochemical Materials Group
 - Polymer Research Laboratory

• AALTO:

- Materials Processing Lab
- UPO:
 - Applied Medical Technologies
 - Applied Biology
 - Immunology
 - Virology and Intrinsic Immunity
 - Biological Mass Spectrometry

ARI:

- Sound Guided Tissue Regeneration Group
 - Cartilage and Intervertebral Disc Group



ExcellMater FTM as the focal point spreading the knowledge to its local partners and then to the wider community







Dedicated focus on early stage researchers

Dedicated focus on strengthening the research management and administration skills formation of an internal expert group at FTM



FFERCEIIMater Project activities and outcomes













• Kick off meeting: November 12, 2020, online







- 3 PSC meetings
- ExcellMater website https://excellmater.tmf.bg.ac.rs/
- Twitter account









- Scheduling STSE, SEV and events: ongoing all activities moved to end of 2021, 2022 and 2023
- Communication activities: ongoing (flyers, videos, with the help of the student organization at FTM)
- Planned joint participation in several conferences (YUCOMAT2021, TERMIS2021 (joint symposium accepted), EORS2021, ESB2021)
- Plan for some joint experiments (currently mostly exchange of samples for characterization)
- Additional online events?





Thank you for your attention!

