Reports from WP 1:

Mass separation of innovative medical isotopes

Klaus Wendt

LARISSA Institute of Physics, University of Mainz, Germany

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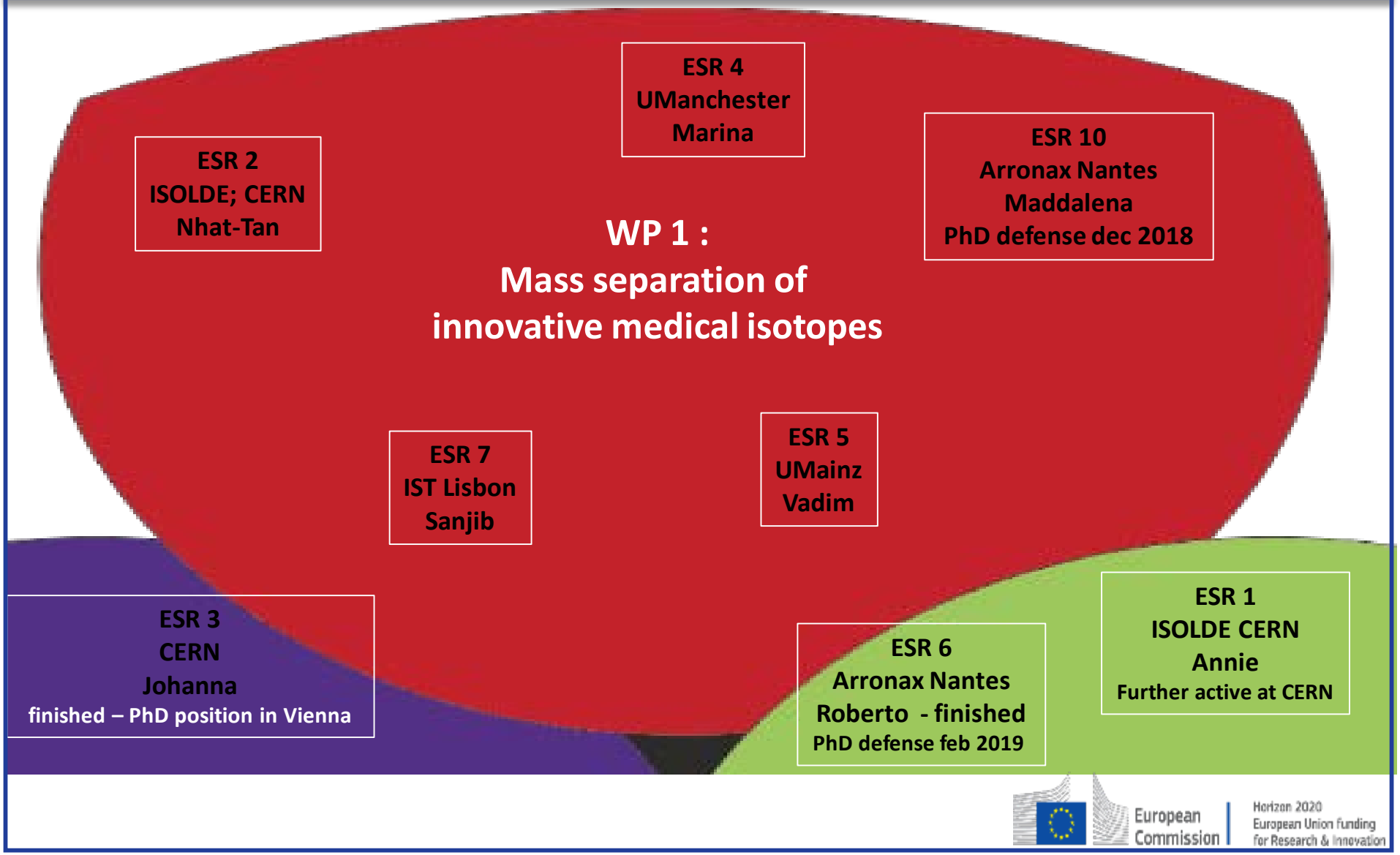
Overview: WP 1 and related ESR´s of MEDICIS Promed



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WP 1 – Production & Purification of Innovative Medical Isotopes 3

Laser Ionization and Beam Purification

ESR 5 Vadim Mainz, ESR 6 Roberto Nantes

Target Development
ESR 4 Marina, ESR 7 Sanjib
Manchester & Lisbon

Ion Optics & Isotope Collector

Chemical Separation
& Conditioning
ESR 2 Nathan Geneva

ESR 1 Annie &
ESR 3 Johanna CERN
ESR 10 Maddalena Nantes

Transport Container
Development
ESR 10 Maddalena Nantes

Remarkable progress made at CERN MEDICIS:

- documented e.g. in PhD thesis of Roberto Formento with defense on Feb 12th 2019 in Nantes
- Installation of MELISSA laser lab with pump laser, first Ti:Sa laser and launch system

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ESR #2: Nhat-Tan Vuong (CERN, Geneva) Status 01/19 4

Topic - Development of oxidation processes for storage of next generation of UCx target materials
- Chemical **separation** of radioisotopes at the CERN-MEDICIS facility

Milestone 5 (10/17) ***Operation and Radioprotection of mass separated isotopes at MEDICIS***
delivered in 6/2018 **ok**

Deliverable 1.5 (7/18) ***Production of $^{149/152}$Terbium theranostics isotopes at CERN-MEDICIS and shipping***
delivered in 9/2018 **ok**

Secondments **ok**

- Arronax, Nantes, France Jan. 2017 3 months
- CTN, Lisbon, Portugal Oct-Dec 2018 3 months

Scientific Achievements **ok**

- contributions to CERN MEDICIS activities on 12 targets so far and during 2019 shut down
- installation and commissioning of a nuclear glovebox for the thermal analysis of non-irradiated nano UCx and irradiated micro UCx samples.

Conferences, Trainings, Outreach **ok**

all MEDICIS Schools, CNAO and very active in KUL & CERN Outreach

PhD Graduation **ok**

reasonable time frame given for PhD defense in dec 2019 (3,5 years)

Personal career: CERN doctoral student programm up to dec 2019 **ok**

ESR #4: Marina Nazarova (Graphene Institute, UK) Status 01/19 5

Topic **"Metallic foil targets with protective graphene layers to produce innovative isotopes"**

Milestone 1 (11/16): ***Graphene growing and characterization on Tantalum foils as protective layer***
delivered in time as journal article in „Graphene" **ok**

Deliverable 1.1. (7/18): **Metallic foil targets with protective graphene layers to produce innovative isotop**
delivered to CERN for further investigation **ok**

Secondments:

- CERN, Geneva, Switzerland postponed from 2017 still in preparation **???**

Scientific Acheivements: - change of target metal Ta, Th, U replaced by Rh and UC
- so far work successfully done to about ≥50% **???**

Conferences, Trainings, Outreach **ok**

all MEDICIS Schools, Journee des Actinides 2018, Portugal

PhD Graduation **ok**

experimental part finished in Nov 2018 (36 months)
presently finalizing the written part for defense in spring 2019

Personal career:

six months extension granted by Manchester University up to June 2019 **ok**

ESR #5: Vadim Gadelshin (JGU Mainz) Status 01/19 6

TOPIC **"Remotely operated Laser Ion Source for radiolanthanide purification at medical accelerator facilities"**

Milestone 3 (03/17) ***Laser Ionization with high efficiency of ^{177}Lu beams*** **ok**
achieved on ^{177}Lu, published in RCA spec. issue jan 2019 and EMIS proceedings

Deliverable 1.3 (03/18) ***Remotely operated Laser Ion Source for radiolanthanide purification*** **ok**
delayed to 03/19 - delivered as part of the PhD thesis

Secondments **ok**

- CERN, Geneva, Switzerland — Mar – Aug 2017, Feb – Dec 2018 — >12 months
- Arronax, Nantes, France — Aug - Sept 2018 — ~1 month

Scientific Achievements **ok**

- laser ion source development MELISSA for CERN MEDICIS facility

Trainings and Conferences

- all Medicis schools, contributed talks at DPG Erlangen 03/18, R&D Russia 03/18, EMIS 09/18

PhD Graduation **ok**

experimental part finished, PhD defense planned for june 2019 (3,3 a)

Personal career: **ok**

six months extension granted by JGU Mainz up to June 2019

ESR #7: Sanjib Chowdhury (IST, Lisbon, Portugal) Status 01/19 7

Topic **Uranium carbide nanofiber targets for increased stability and extraction yield of alpha-emitting radioisotopes**

Milestone 2 (6/16) ***Synthesis of nanofibers of yttrium cabide (instead of lanthanum)***
delivered in time with slight change of topic **ok**

Deliverable 1.2 (9/17) ***Uranium Carbide nanofibers target development***
delivered in Feb 2018 **ok**

Secondments:

- **Arronax, Nantes, France** **Oct.-Dec. 2017** **3 months** **ok**
- Advanced Accelerator Applications, France Mar.-May, 2018

Scientific Achievement

Conferences, Trainings, Outreach
all MEDICIS schools, Journee des Actinides 2018, Porto Novo (Posters),

PhD Graduation **ok**
mid term defense in 07/18 successfully completed
final PhD defense foreseen for summer 2019

Personal Career **???**

ESR #10: Maddalena Maietta (Nantes University, France) Status 01/19 8

Topic – Thesis title "Radioprotection aspects associated to radionuclides for medical applications"

Milestone #4 (7/16) *Development of a container type B(u), for alpha isotopes transport*
delivered in time **ok**

Deliverable 1.4 *(3/17)* *New shielded packaging container for nuclear medicine isotopes*
achieved in 2018 with two packaging prototypes **ok**

Secondments: short - only two months!!! **ok**

- CERN, Geneva, Switzerland March 2017 1 months
- CERN, Geneva, Switzerland Dec. 2017 1 months

Scientific Achievement **ok**

installation and commissioning of CERN MEDICIS Radiochemistry Lab

Conferences & Trainings **ok**

all MEDICIS schools, 3 international conferences (Geneva, Doha, London)

PhD Graduation: **ok**

PhD successfully defended at Nantes University on Dec 13th**, 2018 – congratulations!**

Personal career: not given

Work Package 1 – List of Milestones

Milestone number [18]	Milestone Title	In Charge	Lead Beneficiary	Due Date (in months) [17]	Means of Verification
MS1 ???	Graphene growing and characterization on Ta foil as protective layer	ESR 4 Marina	2 – Graphene Institute Univ. of Manchester, GB	Nov. 2016	Report delivered
MS2 achieved	Synthesis of nanofibers of Lanthanum carbide	ESR 7 Sanjib	5 – IST, Lisbon, Portugal	July 2016	Report delivered
MS3 achieved	Laser Ionization with high efficiency of ^{177}Lu beams	ESR 5 Vadim	3 – JOGU Mainz, Germany	March 2017	Report delivered
MS4 achieved	Development of a container type B(u), for alpha isotopes transport	ESR 10 Madda-lena	8 – LEMER PAX, France	July 2016	Report delivered
MS5 achieved	Operation and radio-protection of mass separated isotopes at MEDICIS	ESR 2 Nhat-Tan	1 – CERN, Switzerland	Oct. 2017	Report delivered

Work Package 1 – List of Deliverables

Deliverable Number	Deliverable Title	Lead beneficiary	Type	Dissemination level	Delivery
D1.1 ESR 4 Marina	^{99}Mo/Tc production with metal uranium/ graphene targets at CERN-MEDICIS	2 – Graphene Institute Univ of Manchester	Report	Public	July 2018
D1.2 ESR 7 Sanjib	Uranium carbide nanofibers target development	5 - IST, Lisbon	Report	Public	Sept. 2017
D1.3 ESR 5 Vadim	Remote laser ion source operation system for installation at medical cyclotrons	3 - JOGU MAINZ	Report	Public	**March 2019**
D1.4 ESR 10 Maddalena	Design of new containers for theranostic isotope pairs transportation	8 - LEMER PAX, Nantes	Report	Public	March 2017
D1.5 ESR 2 Nhat-Tan	Production of theranostics $^{149/152}$Tb at CERN-MEDICIS and shipping	1 - CERN	Report	Public	July 2018

Conclusions → Thanks to the ESRs and Acknowledgements

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Johannes Gutenberg Universität Mainz JG|U