

# Support for circular materials research from analytical research infrastructures



*A hub for  
materials research*



[remade-project.eu](http://remade-project.eu)

Nadia Day, MAX IV, Lund University  
26 September 2024

# ReMade@ARI = Recyclable Materials Development at Analytical Research Infrastructures



CALL: HORIZON-INFRA-2021-SERV-01-04: Research infrastructures services enabling the development of materials for a circular economy

EU funding: 13.7 million EUR + 1.8 million EUR from Switzerland and UK

44 partners;  
HZDR is coordinator;

Started on 01 September 2022;  
Duration 4 years  
Operational from early 2023



# Who are we? ReMade@ARI: Partners



- 48 Analytical research infrastructures from the ARIE network ([arie-eu.org](http://arie-eu.org)) comprising synchrotrons and XFEL, neutron sources, lasers, electron microscopes, ion and positron beams, and high magnetic field facilities. Complementary facilities are provided by CERIC-ERIC, Heyrovský, pELBE and p@FRMII.
- Danish Technological Institute
- University of Bonn

## ARIE is a hub of RI networks

- Accelerator-based light sources - *League of Accelerator-based Photon Sources (LEAPS)*
- Ion beams – *RADIATE*
- Laser light sources – *Laserlab-Europe*
- Electron microscopes - *e-DREAM*
- Neutron sources - *League of Advanced European Neutron Sources (LENS)*
- High magnetic field laboratories - *European Magnetic Field Laboratory (EMFL)*
- Proton beams – *INSPIRE*



Analytical Research Infrastructures in Europe: [arie-eu.org](http://arie-eu.org)

No but  
really....  
**WHO** are  
we?

## Annual Meeting

Sept 2024  
Ljubljana,  
Slovenia

**Jozef Stefan  
Institute**



## 44 Partners

- 44 User Offices
- 350 machines/  
Instrument  
Scientists
- Smart Science  
Cluster
- Workpack  
leaders and  
teams

**= 450+ TEAM  
at your disposal!**

# What do we offer?

## Free access to research infrastructures and assistance



- 50,000 hours of **trans-national access** (TNA) to over 50 research infrastructure facilities (RIs)
- Materials characterisation using complementary techniques
- Expert support beyond the usual service offer of the RIs (16 junior scientists)
- Open to academic researchers and industry
- Additional tailored access for industry: 1. fast access for SMEs; 2. Grants for RTOs to assist industry, to translate industry problems into RI experiments
- Outreach and training to new communities
- Provides an opportunity for users from countries with few national facilities to access a large range of RIs



# How do you access materials characterisation at our RIs?



- Application via a single portal
- Two step application:
  - Submit a research idea for rapid feedback  
=> Expert network gives feedback on feasibility and guidance on choice of techniques and RIs
  - Proposal submission
- Ranking of proposals by an external advisory board
- Accepted proposals will be granted beamtime, and expenses will be covered for travel
- Dedicated young scientists will help during experiments
- Mail in and remote access available for many experiments and analyses

# We offer tailored access for industry

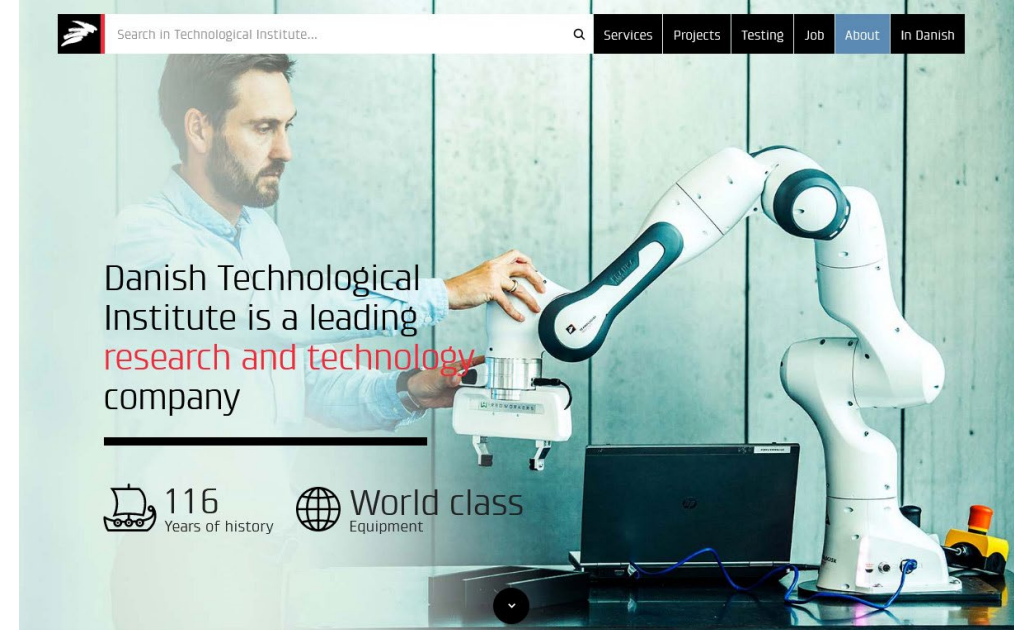


## ReMade-SME: Rapid test experiments for SMEs

- Comprehensive support including data analysis
- SMEs have no obligation to publish

## ReMade-IND: Pioneer Innovation Pilot

- Collaborate with an RTO to test your idea in industry
- Comprehensive support including data analysis
- Inspire your innovation through a grant scheme
- Grants of 50% support from RTOs and other actors
- Aim for commercialization through pilot sites
- Identify and operate on a pilot site



DTI is a project partner.  
Other RTO's are invited to participate.  
If needed, we can help industry identify a suitable partner.

# Where to find us?



<https://remade-project.eu/>



a hub for materials research

What is ReMade@ARI? ▾ Offer & User Access ▾ Industry and Innovation Events ▾ News FAQ Contact

Currently accepting Standard and SME proposals

What about using our tailored services to conduct your circular materials research?

**Apply & Access**  
our Research Infrastructures  
to develop your sustainable materials

**ReMade@ARI**  
Recyclable Materials Development @ Analytical Research Infrastructures | A hub for material research  
Research · 850 followers · 0-1 employees

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# Webinars 2024



9 February - 2pm | Peter Fouquet | ILL, France

**Neutron spectroscopy studies of hydrogen and oxygen diffusion in energy materials**

28 March - 10am | Giulio Cerullo | Polimi, Italy

**Ultrafast transient absorption spectroscopy**

12 April - 10am | Virginia Boix de la Cruz | ALBA, Spain

**Unlocking Circular Economy Solutions: Industrial Access to Cutting-Edge Research Infrastructures with ReMade@ARI**

16 May - 2pm | Matej Gabrijelčič | Kemijski Inštitut, Slovenia

**Solid-state nuclear magnetic resonance used for operando studies of Na-ion batteries**

24 May - 2pm | Daniela Comelli | Politecnico di Milano, Italy

**Time-resolved fluorescence imaging**

31 May - 10am | Virginia Boix de la Cruz | ALBA, Spain

**Unlocking Circular Economy Solutions: Industrial Access to Cutting-Edge Research Infrastructures with ReMade@ARI**

28 June - 2pm | Anna Mackova | NPI, Czech Republic

**Ion beam modification and synthetization of materials and surfaces for sensorics, bioapplication and photocatalysis**

5 July - 10am | Timur Nikitin | CLL, Portugal

**The Circular Economy: How Raman Spectroscopy Can Help Close the Loop**

6 September - 2pm | Kim Nygård | MAXIV, Sweden

**Multiscale structural characterization by scanning SWAXS imaging**

27 Sept - 10am | Cristian Manzoni | IFN-CNR, Italy

**Hyperspectral Imaging and microscopy**

22 November - 10am | Andreas Stierle | UH & DESY, Germany

**Exploring catalytic reactions from the ensemble average to the single particle limit using X-rays and scanning probe microscopy**

6 Dec - 10am | Yvette Ngono-Ravache | CIMAP, France

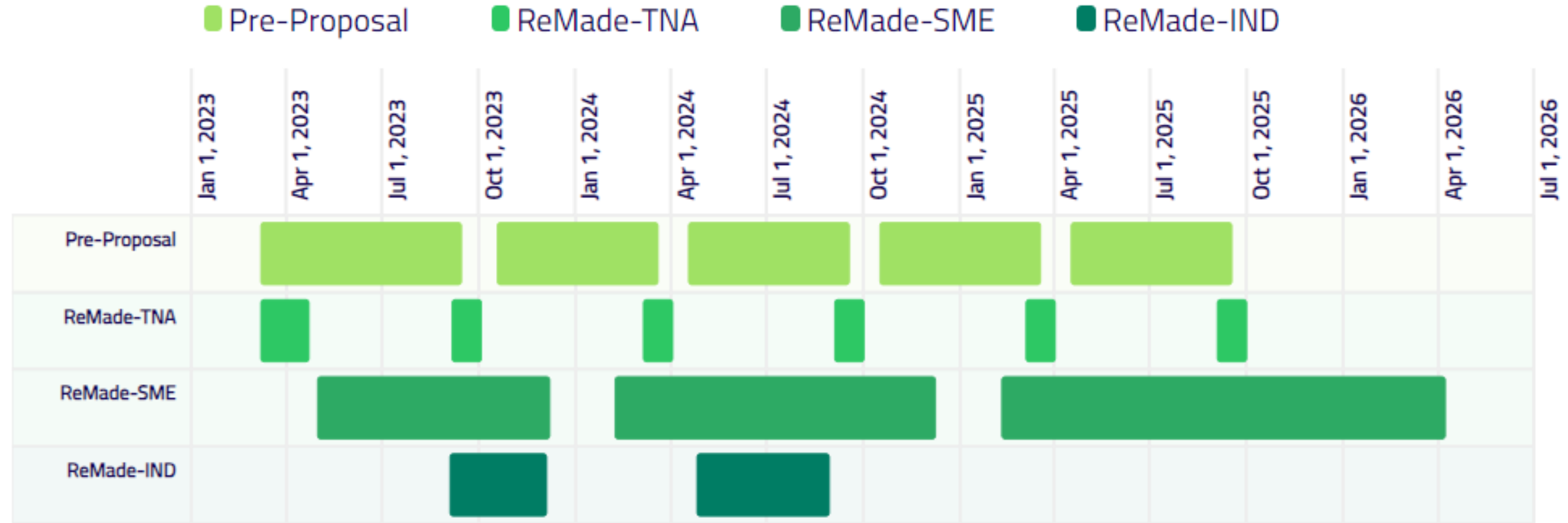
**Polymer under ionizing radiation : an evolution towards recycling**

The video player displays a slide with the following content:

- Multiscale structural characterisation by scanning SWAXS imaging**
- Kim Nygård, MAX IV Laboratory
- [kim.nygard@maxiv.lu.se](mailto:kim.nygard@maxiv.lu.se)

The player interface includes a ReMade@ARI logo in the top right corner, a small video thumbnail of the speaker, and a control bar at the bottom with a play button, a progress indicator at 0:02 / 45:37, and icons for chat, settings, and full screen.

# When can I apply? The ReMade Call Schedule



# I NEED HELP!

Submit a  
*simple*  
**Pre-Proposal**  
and our  
**Smart Science Cluster**  
will support you

## ReMade Pre-Proposal Submission

### Application Details

Application Title:

255 characters remaining

Application Team:

In addition to the applicant, indicate other members that will be part of the application. Only scientists mentioned in this section will be eligible to manage or modify the application in the future.

Please provide the email address of the main applicant (\*):

99 characters remaining

What is the connection of the project to the Circular Economy? (\*):

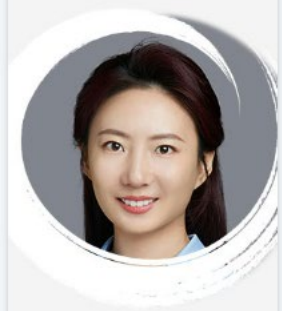
300 characters remaining

Please describe the material/sample under investigation (size/morphology/environment). (\*):

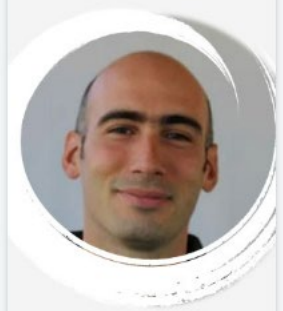
300 characters remaining

What is the goal of the experiment/ what do you want to characterize? (\*):

300 characters remaining



Junior Scientist For Electron Microscopy  
**YAN LU**



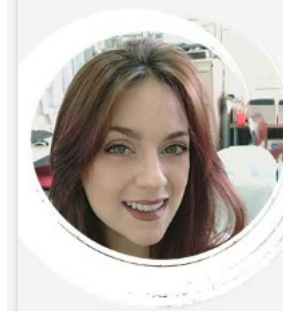
Junior Scientist For X-Ray Imaging  
**GIOVANNI FEVOLA**



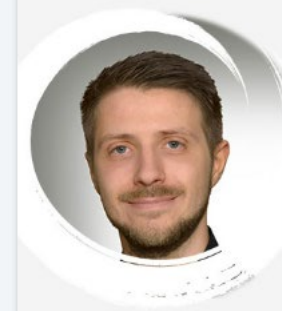
Junior Scientist For Focused Ion Beam  
**MARIA BROLLO**



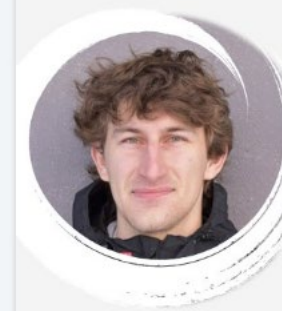
Junior Scientist For Small Angle Neutron Scattering (SANS)  
**ASHLEY WILLIAMS**



Junior Scientist For Ion Beam Analysis  
**NOELIA MALDONADO**



Junior Scientist For Positron Annihilation Spectroscopy  
**ERIC HIRSCHMANN**



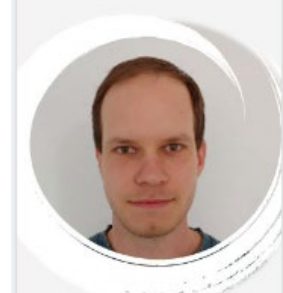
Junior Scientist For Laser Material Processing  
**JURAJ SLADEK**



Junior Scientist For X-Ray Tomography  
**ZHENGANG ZHANG**



Junior Scientist For Small-Angle X-Ray Scattering  
**SANTIAGO PABLO FERNANDEZ BORDÍN**

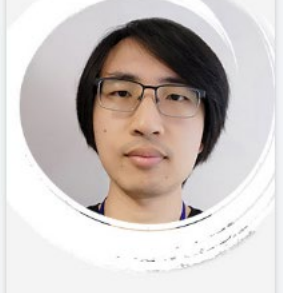


Junior Scientist For High Magnetic Fields  
**SVEN LUTHER**

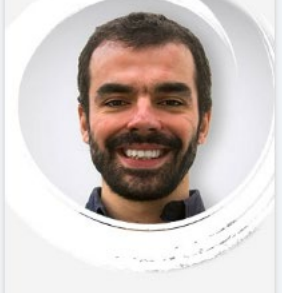
# Our Smart Science Cluster!



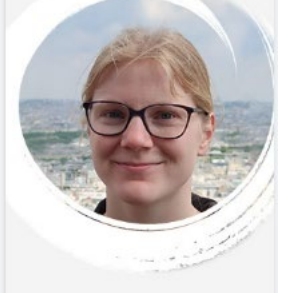
Junior Scientist For Laser Photo Chemistry  
**FÁBIO SCHABERLE**



Junior Scientist For Small Angle Neutron Scattering (SANS)  
**YI ZHANG**



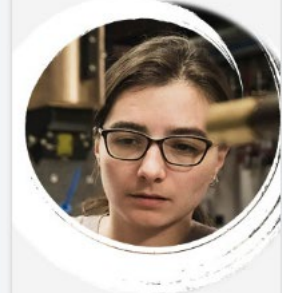
Junior Scientist For Ion Beam Materials Modification  
**MIGUEL C. SEQUEIRA**



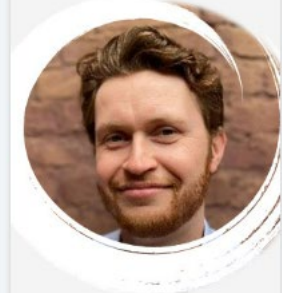
Junior Scientist For Neutron Spectroscopy  
**BETTINA SCHWAIGHOFER**



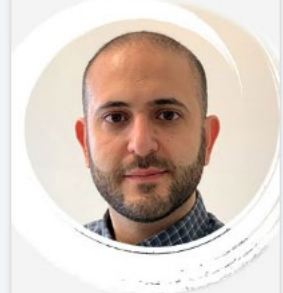
Junior Scientist For X-Ray Spectroscopy  
**ARAM BUGAEV**



Junior Scientist For X-Ray Diffraction  
**MARTA MIROLO**



Junior Scientist For Electron Microscopy  
**PAUL PACIOŁ**



Junior Scientist For Ion Beam Analysis  
**MASOUD DIALAMEH**

# Am I eligible?



Transnational Access (TNA) is provided in two types:

- in person (physical) access, with users visiting the facilities in person and receiving the service “hands-on”.
- remote access, e.g.” hands-off” access to the facility, analysis of mail-in samples, remote access to a high-performance computing facility, with resources and services offered without users physically visiting the facility/installation.

To be eligible for TNA, the following criteria must be fulfilled:

- The PI and the **majority** of the team must work in a country **other than the country(ies) where the facilities are located**, unless access is provided by an international organisation such as an ERIC .
- Only user groups that are allowed and willing to **disseminate the results** they have generated under the action may benefit from the access (unless working for SMEs).
- The **User Feedback Form** in the access portal has been completed and submitted by the applicant for any previous project(s).

# What techniques are available to me?

Electron microscopy	Focused ion beam	High magnetic field	Ion beam composition mapping and imaging	Ion beam analysis - spectrometry
Ion beam materials modification	Laser photo chemistry and spectroscopy	Laser processing	Muon spectroscopy	Neutron-based elemental composition analysis
Neutron diffraction	Neutron imaging	Neutron reflectometry	Small-angle neutron scattering	Neutron spectroscopy
Positrons	X-ray diffraction	X-ray imaging	SAXS-WAXS (Small/Wide-angle X-ray scattering)	X-ray spectroscopy
X-ray tomography		Nuclear magnetic resonance (NMR)	NanoEnvicz	

# Some successful technique combinations



**VID: 53651** – Access Ongoing

**(1) ReMade-TNA Standard Access**

X-ray spectroscopy at SOLEIL, Saint Aubin, France (LEAPS) – X-ray spectroscopy

ReMade: Synchrotron Soleil Societe Civile (SOLEIL) (LEAPS)

Session 1 – Pending

ReMade: SAMBA

**VID: 53649** – Access Ongoing

**(1) ReMade-TNA Standard Access**

Nuclear Magnetic Resonance at CERIC-ERIC (SloNMR, Slovenia) (non-ARIE) – Nuclear Magnetic Resonance (NMR)

**VID: 53655** – Access Ongoing

X-ray tomography at ESRF, Grenoble, France (LEAPS) – X-ray tomography

ReMade: The European Synchrotron Radiation Facility (ESRF) (LEAPS)

**VID: 53640** – Access Ongoing

Neutron diffraction at ISIS, Didcot, United Kingdom (LENS) – Neutron diffraction

# Some successful technique combinations



**VID: 53766** – Access Ongoing

X-ray diffraction at ESRF, Grenoble, France (LEAPS) – X-ray diffraction

**VID: 53772** – Access Ongoing

Ion beam composition mapping and imaging at LABEC, Sesto Fiorentino, Italy (RADIATE) –  
ReMade: Laboratory of Nuclear Techniques for Environment and Cultural Heritage (LABEC)

(1) ReM

Session 1 – Pending

**VID: 53775** – Access Ongoing

X-ray diffraction at ESRF, Grenoble, France (LEAPS) – X-ray diffraction

(1) ReM

**VID: 54963** – Access Ongoing

X-ray imaging at DESY, Hamburg, Germany (LEAPS) – X-ray imaging  
ReMade: DESY - Photon Science (PETRA III) (LEAPS)

(1) ReM



# Send us your proposal! ReMade Access Portal

<https://apply.remade-project.eu/>



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Proposal Submission

## Services

Consortium - NanoEnviCz



Electron microscopy



Focused Ion Beam



High magnetic field



## Your Proposals

**PID: 33747**

Number of Visits: 1



[Continue Proposal](#)

Funding Routes: (3) ReMade-IND Service Access

**PID: 30814**



## Services

Electron diffraction

Electron imaging

Focused Ion Beam

High magnetic field

In-situ / operando

Ion beam composition mapping and imaging

Ion beam elemental depth profiling

Ion beams materials modification

Laser photo chemistry & spectroscopy

Laser processing

Neutron diffraction

## ARIA

For more information about ARIA, please visit: <https://aria.services>.

### Getting started with ARIA:

In both cases below, you will be asked to log in or to create an account, if you haven't already done so.

To apply to one of the services to the left, either:

1. Click on the drop down for the service type you are interested in and then click on the link of the specific service. This will automatically start a proposal submission to that service.
2. Click on the "Request Access" button in the top left of the page, you will then be able to add the service (/services) you would like to apply to, through the proposal submission process.

## Services

Electron diffraction

No description.

[Request Access - Electron diffraction, Bellaterra, Spain](#)

[Request Access - Electron diffraction, Jülich, Germany](#)

Electron imaging

Focused Ion Beam

High magnetic field

In-situ / operando

Select your technique

Choose your facility

## Submit a proposal for access

Your draft proposal has been assigned a PID: 24474

Please fill in the following fields describing your project and your needs. Fields marked with \* are mandatory



### Proposal Details

Research Project Title (\*):

test 1

249 characters remaining

Abstract (\*):

test abstract

1987 characters remaining

Area(s) within the Circular Economy to which your proposal applies (\*):

Electronics & ICT  Batteries & Vehicles  Packaging

Scientific merit including impact of the work on the Circular Economy (\*):

test merit



Complete your proposal!

# How is a ReMade proposal reviewed?



- **SCIENTIFIC EXCELLENCE AND METHODOLOGY:** Is the proposed work considered scientifically excellent? To what extent are the proposed methodology and chosen techniques suitable to achieve the research goals?
- **CIRCULAR ECONOMY RELEVANCE:** To what extent is the proposed research relevant for circular economy?
- **NOVELTY AND INTERDISCIPLINARITY:** To what extent does the project address novel and interdisciplinary concepts?
- **COMMERCIAL IMPACT:** How do you evaluate the potential commercial impact of the project?

# How is the Circular Economy relevant?

Successful ReMade proposals have a good/strong connection to the Circular Economy.

Essential for materials for a circular economy. The highest scores should be given to proposals that directly target the replacement of another material currently in use, which cannot (or not easily or economically) be recycled. Examples:

- Replacing rare earth elements in electronics
- Exploiting recycled Si as battery anode
- Characterising materials based on organic fibres to evaluate their use for packaging
- Developing polymers from processed plants to replace polymers from petroleum
- Designing textiles from sustainable materials in view of repair and reuse
- Developing construction materials from organic matter replacing steel and concrete
- Substituting single-use cutlery by reusable products in food services

# What are my chances of success?

- 71% of proposals accepted in the last Call
- 29% rejected (11% of these rejected as ineligible)
  
- Submit a pre-proposal! Your chances of success are considerably increased!

# Many thanks for your attention

remade-project.eu

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[nadia.day@maxiv.lu.se](mailto:nadia.day@maxiv.lu.se)



UK Research  
and Innovation

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