

Virtual EIT Raw Materials Training for University students and managers *European Researchers Night 2020* (ERN-Apulia 2 - H2020-MSCA-NIGHT-2020 Grant 955297)

*Training for University students (Bachelor, Master, PhD), researchers, innovators,
professionals, managers, regional stakeholders and wider society*

ERN 2020 - European Researchers Night 2020

27 November 2020, Time: 10.00 - 13.00

On-line event

The EIT RawMaterials is a platform for innovation funded by the European Institute of Innovation and Technology (EIT). The EIT has created the so-called KIC - Knowledge Innovation Communities, communities that aim to promote innovation and education in Europe in crucial sectors, supporting entrepreneurship and enhancing the passage of new ideas from the incubation phase to the market.

The EIT RawMaterials, which has established one of its nodes in Rome since 2016, is particularly committed to addressing the global challenge of supplying raw materials in Europe through programs and projects that aim to develop technology throughout the entire value chain of raw materials: from the exploration of resources, to the mining industry, from metallurgical processes to the replacement of critical or toxic raw materials, from the recycling of end-of-life product materials to the design of products for the circular economy.

As part of regional development programs, the EIT RawMaterials has created a Hub in the Puglia Region, coordinated by ENEA and participated by CNR, in order to increase the involvement of the local ecosystems in the activities of the KIC and its partnership.

The **Regional Center Southern Italy (RCSI)** will also aim at reaching new organizations and promote the participation of the most innovative industries, companies, SMEs, start-ups and spin-offs, as well as the involvement of the prestigious Universities and Research Centres in the area.

The Strategic Agenda of the Hub - RCSI includes specific initiatives such as research and innovation, training and education, and finally business support.

The **Virtual EIT Raw Materials Training** during European Researchers Night (ERN-APULIA 2, H2020-MSCA-NIGHT-2020, Grant 955297) will be organised for training Bachelor and Master students, as well as PhDs and members of Professional Orders, about the issues related to raw materials, with particular attention to critical raw materials, which are those materials defined by the EU commission as “critical” due to the high risk of supply shortage expected in the next 10 years and for their importance to the European industry. The Virtual Training brings together researchers from academia and industry in order to discuss the challenges related to end-of-life products recycle and in particular to critical raw materials recovery, valorisation, reuse and substitution.

Agenda

- 10:00 - 10:15 **Opening and Welcome**
Dr. Maria Lucia Protopapa (Chair)
ENEA Researcher, Laboratory of Functional Materials and Technologies for Sustainable Applications, ENEA Brindisi Research Center - Brindisi, Italy
- 10:15 - 10:30 **EIT RawMaterials Hub - Regional Center Southern Italy: Overview and Plan**
Dr. Michele Penza
Head of Laboratory of Functional Materials and Technologies for Sustainable Applications, ENEA Brindisi Research Center - Brindisi, Italy
Coordinator of EITRM Hub - Regional Center Southern Italy
- 10:30 - 11:15 **Valorisation of Antimony and Titanium through plastics recycling: two case studies in view of the circular economy**
Dr. Caterina Picuno
Hamburg University of Technology, Research Associate - Hamburg, Germany
- 11:15 - 12:00 **The WEEE jungle: an electronic urban mining**
Dr. Antonella Castellano
ERION, Projects and Innovation Specialist - Milan, Italy
- 12:00 - 12:45 **Technological solutions for more eco-sustainable advanced composite materials**
Ing. Flavio Caretto
ENEA Researcher, Laboratory of Functional Materials and Technologies for Sustainable Applications, ENEA Brindisi Research Center - Brindisi, Italy
- 12:45 - 13:00 **Discussion and Conclusions**

Further Information

The participation is free of charge. After registration, the participants will receive a link to follow online the scheduled event.

Registration

For the free of charge registration please go to the link:

<https://www.enea.it/it/sequici/events/virtual-eit-raw-materials/virtual-eit-raw-materials-notte-europea-dei-ricercatori-2020>

Language

English is the official language. The slides of the presentations will be in English, but they will be commented in the native language (Italian) of the RCSI area.

Contact

Email: info@eitrawmaterials-rcsi.eu

Website: www.eitrawmaterials-rcsi.eu

RCSI Coordinator: Dr. Michele Penza - michele.penza@enea.it

Organized by:



Supported by:



Collaborated by:



Program and Speakers

Valorisation of Antimony and Titanium through plastics recycling: two case studies in view of the circular economy

Dr. Caterina Picuno

Recently, antimony (Sb) has increasingly become a critically exhaustible resource and, therefore, it has been included among the group of Critical Raw Materials (CRMs) by the European Commission (EC). The full dependency of many European industrial sectors on the supply of Sb from extra-EU countries - the EC reports a 100% dependency on imported raw material with 62% originating from Turkey - is rapidly stirring concerns regarding possible disruptions of its secure and sustainable supply. In this sense, particularly relevant are the applications of Sb in flame retardants (43%), lead batteries and lead alloys (46%), as catalyst in the production of polyethylene terephthalate (PET) (6%), and for chemicals, glass and ceramics.

The fraction of Sb recovered through recycling activities in EU is estimated to be of circa 28% of the total Sb input in production. In this framework, the major losses occur through the plastic waste stream (i.e. used in flame retardants or as a catalyst for PET).

Similarly, the relevance of titanium (Ti) in the plastics industry, particularly in the packaging sector, is gaining momentum. Also in this case, the EU relies fully on extra-EU supply, which originates mainly from China, Russia and Japan. As mentioned, Ti is used in the production of plastics, particularly of materials based on polyethylene (PE), as one of the components of the Ziegler-Natta catalysts. Besides, Ti is extensively used as an additive in plastic packaging, particularly in form of titanium dioxide (TiO₂). Along with being a CRM, recent concerns have risen in terms of its safety for the human health. All these aspects contribute to the definition of the possibility to recover this CRMs from plastics as well as from packaging, which, in turn, have been identified as two of the seven priority areas in the Circular Economy Action Plan of the EU.

With these premises, the seminar has a dual aim. The first is to provide the current flows along the plastics value chain of antimony and titanium, particularly in the packaging sector. The second aim is to define the role and the importance of retaining these CRMs within the material cycles, while also drawing a framework of the current research approaches for their recovery from plastic products.



Caterina Picuno is Senior Researcher and final year PhD Candidate at the Hamburg University of Technology, Germany. She is project manager of research projects (H2020) as well as capacity building ones (Erasmus+). Her expertise revolves around sustainable management of municipal solid waste, with a particular focus on packaging waste recycling technologies. She is scientific advisor for several third party funded projects, assessing the quality of recycled plastics (in terms of mechanical behaviour, processability and degradation) as well as investigating the level of metal oxides and modelling their flows throughout the value chain.

The WEEE jungle: an electronic urban mining

Dr. Antonella Castellano

WEEE (Waste Electrical and Electronic Equipment) is currently considered to be one of the fastest growing waste streams, growing at 3-5 % per year in European Union and containing many different materials that have environmental impacts and health risks if treated inadequately. On the other hand, the reuse of EEE (Electrical and Electronic Equipment) and the recycling of WEEE offer substantial opportunities in terms of extension of End of Life (EoL) of appliances and making secondary raw materials available on the market, in a sustainable and circular economy point of view. The main objective of the correct WEEE management, and therefore of their treatment, is to protect the environment and human health, obtaining energy savings and a limited use of primary resources too. From WEEE treatment, fractions of secondary raw materials are obtained, such as plastics, copper, aluminum, iron, which can be reused on the market to manufacture new products, and in some cases even precious metals, such as palladium, gold and silver. Potentially, also critical raw materials, the so-called CRMs defined by the European Commission, could be recovered. CRMs are important commodities for the European economy, both economically and strategically, because they have a high supply risk and are currently not replaceable due to their unique properties. Today, CRMs consist of 30 raw materials, many of which are used in the production of both electronic equipment for everyday usage (e.g. consumer electronics, small EEE) and green technologies (e.g. renewable power plants or batteries of electric/hybrid cars). The studies on the recovery of these critical raw materials from WEEE, through the exploitation of urban mines (urban mining), although technologically possible, represents the challenge to which many research groups are facing with, in order to find solutions economically sustainable.



Antonella Castellano is Projects and Innovation Specialist in ERION, the Italian leading consortium for the management of electronic waste (WEEE). She supports research activities in the context of projects funded by the European Union (e.g. H2020, EIT-Climate KIC, EIT-Raw Materials) on issues of environmental importance, technological innovation and circular economy, such as the definition of new standards to increase the recycling of CRMs from WEEE and batteries, or in education.

Antonella holds a specialist degree in Geological Sciences and Technologies at the University of Milan-Bicocca with a thesis in Mining Georesources and a Master in Energy Management at the MIP-Business School of the Politecnico di Milano.

Technological solutions for more eco-sustainable advanced composite materials

Ing. Flavio Caretto

Carbon Fibre Reinforced Polymers (CFRP) are a typology of composite materials increasingly used in the transport sector, with the expectation that their contribution, in terms of lightening, will lead to environmental benefits. Just think that, in 2019, the global demand for CFRP has been estimated at around 141,500 tons.

However, it must be recognized that carbon fibres are not really "green". Indeed, these fibres involve high energy intensity consumes for the production (55 to 165 kWh/kg compared to around 50 kWh/kg for aluminium), around 30% of fibres produced becomes industrial waste and the industrial supply chain for the recycling of CFRP is not ready.

The reuse and recycling of waste materials, both post-use and deriving from transformation processes, are essential concepts in the design and manufacture of innovative products to be proposed to the market, fully complying with the new European Directives, that require the emission of waste into the environment to be minimized and to support Circular Economy paths.

Therefore, creating novel solutions for realizing marketable large-scale, innovative, advanced and lightweight Recycled Carbon Fibres Reinforced Polymer (rCFRP) composites for the transport industry represents an important opportunity from both an environmental and economic point of view.

These materials will simultaneously offer a lightening solution, economically and environmentally more attractive.

The seminar will be an opportunity to deepen the research carried out by ENEA about new recovery processes of carbon fibres (a high-cost raw material whose scraps have to be treated today as special waste). Thanks to ENEA technological solutions, these scraps now find a new use in the production of advanced technical products, which find applications in various industrial sectors.



Flavio Caretto works in ENEA as Technologist Materials Engineer, with two-decade experience in R&D activities in the field of materials and processes engineering as well as innovation. He worked on scientific projects dealing with technical fibres and their complex composites for technological applications and devices. He has relevant experience in the field of recycling of carbon fibres and he is authors of several papers and patents on this subject. Currently, he is scientific leader of different national research projects, all focused on the topic of carbon fibre recycling. He was the project coordinator of the REVALUE, an international project within the framework of the EIT RawMaterials.