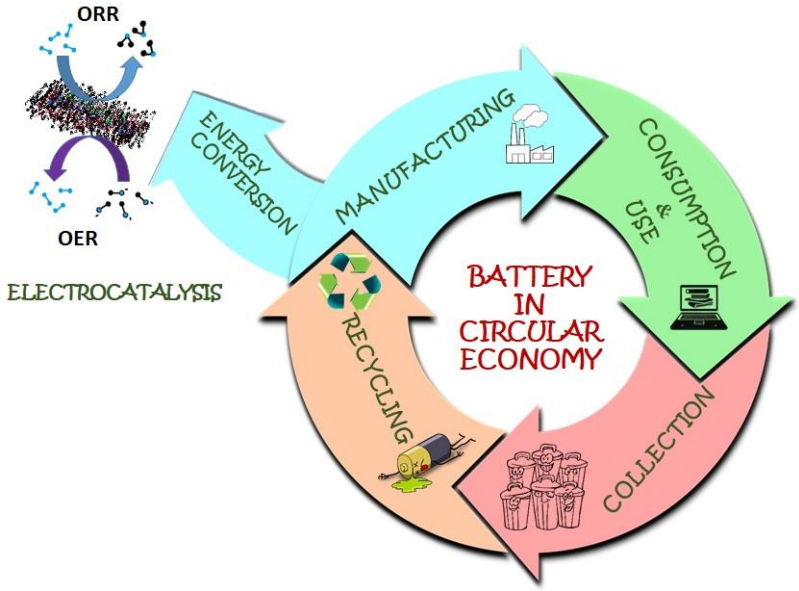
The spent Li-ion batteries as electrocatalysts for energy conversion systems – Batteries in a circular economy

In the face of diminishing fossil fuel sources, and atmospheric pollution, the development of renewable energy systems has become a necessity! Therefore, within the incoming global energy crisis, the improvement of efficiency of **oxygen reduction reaction (ORR)** and **oxygen evolution reaction (OER)** which are the heart of the energy conversion systems is a hot exploration area and the priority for researchers and engineers.
However, due to the sluggish kinetics of ORR and OER, the **electrocatalysts** are the **critical** materials that significantly improve the performance of energy conversion systems. So far there are two main groups of electroactive materials extensively studied towards ORR and OER: metallic electrocatalysts and carbon-based materials. Unfortunately, **the natural metal sources are quickly running out and there is a strong need to find an alternative way to acquire them**. One possibility is the recovery of metals from spent materials, including batteries. **The spent lithium-ion batteries** are a valuable source of various metals, such as lithium, cobalt, nickel, and non-metal graphite. This motivates us to the battery recycling and exploration of post-leached battery waste as electrocatalysts for ORR and OER. **This is an innovative approach** that promotes **Sustainable Development** and **Circular Economy** and perfectly matches the global strategy: **"today's waste is tomorrow's energy!".**



The proposed Project aims to **<u>understand the interdependence of the structure and composition of the Li-ion battery waste and its catalytic activity and selectivity towards ORR and OER</u>**.
The spent lithium-ion batteries will be recycled by the acid leaching process and then, recovered materials will be explored as a catalyst for oxygen reduction and oxygen evolution reactions.
The results gained under the proposed Project will allow us to **understand and broaden the knowledge of mechanisms involved in the ORR and OER using battery waste as catalysts** and **has an impact on the science development by the improvement of OER/ORR performance utilized in the clean energy conversion systems.**