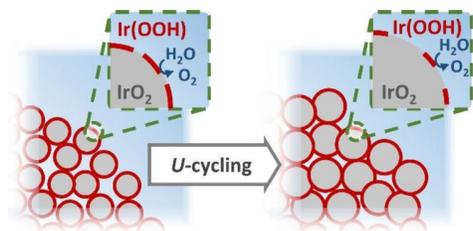


## Operando X-ray Characterization of High Surface Area Iridium Oxides to Decouple their Activity Losses for the Oxygen Evolution Reaction

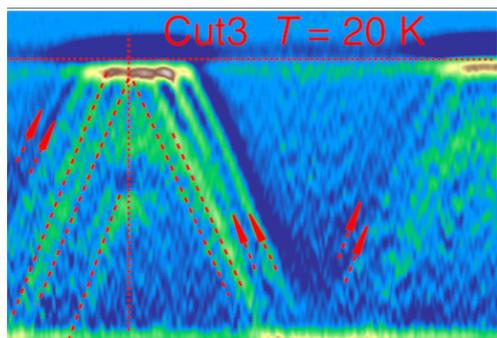


The increasingly popular power-to-gas technology for the utilization of hydrogen as a clean energy vector involves the use of electrolyzers to convert water into  $H_2$  and  $O_2$ . The oxygen evolution reaction (OER) is the least efficient among these processes, and a catalyst is required to speed up its kinetics at the high potentials (customarily  $\geq 1.4$  V vs. the reversible hydrogen electrode) at which the reaction takes place. The state-of-the-art OER-catalyst is iridium oxide, a material of extremely limited availability in the Earth's crust and that could therefore

jeopardize the development of this technology in the near future. Thus, to minimize the Ir-loading in such electrolyzers, great efforts are being devoted to develop high surface area iridium oxides that achieve maximum OER activity with minimum amounts of Ir but, on the other hand, tend to suffer from a poor operative stability. In order to clarify the mechanism behind this activity loss, in this study two high surface area iridium oxides were characterized under operando conditions using a novel setup that allows the quasi-simultaneous acquisition of anomalous small angle X-ray scattering (A-SAXS) and X-ray absorption spectroscopy (XAS) data.

Read more: <https://www.dora.lib4ri.ch/psi/islandora/object/psi:24737>

## Spin fluctuation induced Weyl semimetal state in the paramagnetic phase of $\text{EuCd}_2\text{As}_2$



Weyl fermions as emergent quasiparticles can arise in Weyl semimetals (WSMs) in which the energy bands are nondegenerate, resulting from inversion or time-reversal symmetry breaking. Nevertheless, experimental evidence for magnetically induced WSMs is scarce. Here, using photoemission spectroscopy, we observe that the degeneracy of Bloch bands is already lifted in the paramagnetic phase of  $\text{EuCd}_2\text{As}_2$ . We attribute this effect to the itinerant electrons experiencing quasi-static and quasi-long-range ferromagnetic fluctuations. Moreover, the spin-nondegenerate band structure harbors a pair of ideal Weyl nodes near the Fermi level. Hence, we show that long-range magnetic order and the

spontaneous breaking of time-reversal symmetry are not essential requirements for WSM states in centrosymmetric systems and that WSM states can emerge in a wider range of condensed matter systems than previously thought.

Read more: <https://www.dora.lib4ri.ch/psi/islandora/object/psi:24660>

## PSI School for Master Degree Students - Introducing Photons, Neutrons and Muons for Condensed Matter Physics and Materials Science



From 17 – 21 June 2019 the Neutron and Muon Division (NUM) and the Photon Science Division (PSD) of PSI hosted 18 Master Degree students of physics, chemistry, materials and interdisciplinary science, as well as nuclear engineering to provide an introduction to the characterization of materials with large scale facilities like SINQ,  $\mu\text{S}$ , SLS and SwissFEL. The course taught a basic understanding of how photons, neutrons and muons interact with matter, and how this knowledge can be used to solve specific problems in materials research.