

Smart selection of materials for solar fuel production

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Talk summary

Solar-thermally driven thermochemical H₂O and CO₂ splitting offers a carbon-neutral path to produce feedstocks for synthetic fuel production, such as hydrogen or synthesis gas. This talk will assess the results of the SmartSolFuel project, which focuses on discovering novel perovskite redox materials for solar thermochemical hydrogen production. It will provide an overview of the state of the art of thermochemical cycle technology over time and the current challenges in commercializing this technology. Additionally, it will discuss the properties of redox materials and how they affect the production of solar thermochemical fuels and the efficiency of the process. The need of discovery of new materials is essential for commercializing thermochemical cycles. The discovery of optimum material compositions could be effectively achieved by a combination of DFT, machine learning, experimental testing and system modelling, which is the main novelty of the project SmartSolFuel.

Biography

Dr. Alicia Bayon is a researcher at ICP-CSIC. Before that, she completed her PhD at IMDEA Energy in Madrid, Spain, in 2014, acquiring expertise in materials synthesis and characterization. From 2014 to 2020, she moved to CSIRO Energy (Australia) as a Postdoctoral Fellow, where she worked on five research projects performing modelling, simulation, and optimization of processes. From 2020 to 2022, she was appointed at Arizona State University (USA) as a Research Scientist, where she worked on four projects funded by ARPA-E and the DOE on a novel thermo-electrochemical process and a thermoelectrical energy storage device. In February 2022, she joined ICP-CSIC via the prestigious Talent Attraction Program of Comunidad de Madrid (with 475,000 € funding). She has been working on twelve international research projects and consortiums, two of them with companies. She has attracted more than USD five million in funding in the USA, Australia, and Spain. She has supervised three doctoral theses to completion and is currently supervising two more PhD students (in Australia and Spain). She has co-authored forty research articles, with more than twenty-five in Q1. She has given more than fifty conference presentations, eight of which were as invited speaker in the USA, Australia, Japan, India, and Spain.