

Materials science students for Bachelor/Semester/Master Thesis

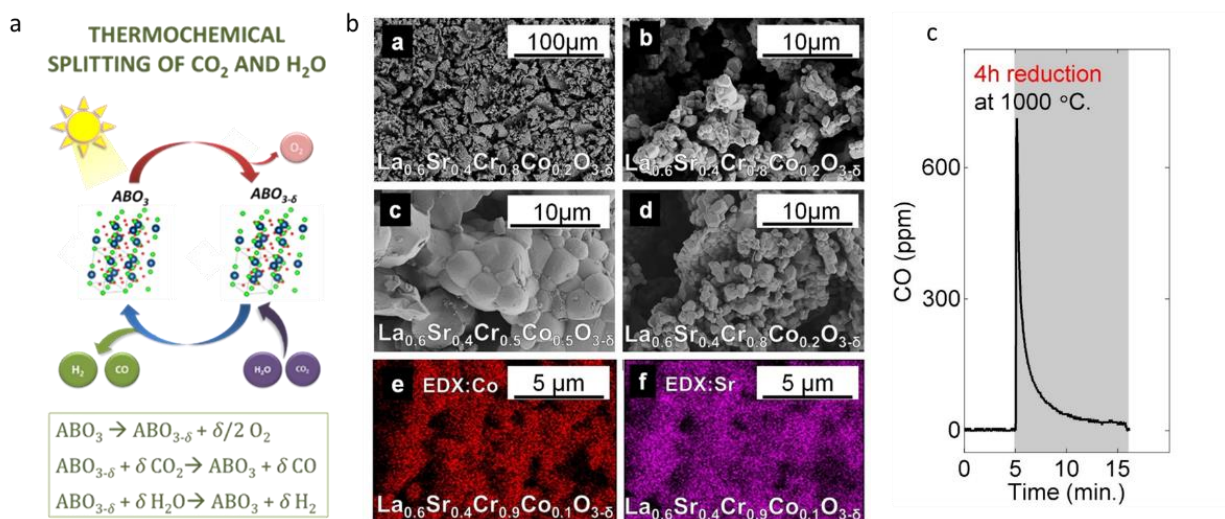
We look for a creative student (Bachelor/Semester Project/Master Thesis) with a strong interest in solving energy-related problems with the help of material science.

Solar-to-fuel : Motivation

The increasing energy demand and environmental concerns associated with global warming urge society to move towards cleaner alternatives that make use of renewable resources. One of the most powerful energy sources available in the Earth is sun radiation. However, technologies that make use of solar energy still face technical and economical challenges, mainly limited by the inherent intermittence of this renewable source. A promising strategy to solve this problem is the so-called Solar-to fuel conversion, in which solar thermal energy and a metal oxide are used to thermochemically split CO_2 and H_2O into H_2 and CO (syngas), which can be further transformed into liquid fuels through the Fischer-Tropsch process.

The project

The project will be focused on synthesis of metal oxides, structural characterization (SEM, EDX, XRD, Raman) and kinetic analysis of the reactions involved in this 2-step process, using a lab-scale solar-to-fuel reactor and/or thermogravimetric analysis. Creative and analytical thinking will be required for optimizing the materials, processes and the reaction set-up, which in turn will help in adding more insights in the physicochemical mechanisms involved in this novel and promising technology.



a) Two-step thermochemical CO_2 H_2O splitting using redox cycles of perovskites. b) SEM and EDX analyses of promising materials. c) CO production as a result of CO_2 splitting using perovskite materials.

References

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Contact: Dr. Alfonso J. Carrillo, alfonso.carrillo@mat.ethz.ch

HPP P23, +41 44 633 78 96

Electrochemical Materials, Prof. J.L.M. Rupp