



PROGRAMUL DE COOPERARE ELVEȚIANO-ROMÂN  
SWISS-ROMANIAN COOPERATION PROGRAMME

## Advanced thermo-chemical looping cycles for the poly-generation of decarbonised energy vectors: Material synthesis and characterisation, process modelling and life cycle analysis

<b>Starting Date</b>	01.01.2013
<b>Duration</b>	36 Months
<b>Discipline</b>	Engineering sciences

### Main Goals

The main goals of this project are the design and evaluation (using experimental and computational methods) of advanced carbon dioxide capture approaches for the poly-generation of decarbonized energy vectors based on chemical looping concepts. The successful completion of this project would contribute to the design of highly efficient oxygen carriers and (catalytic) CO<sub>2</sub> sorbents



### Activities

The project activities cover both the design and manufacture of advanced multi-functional materials for chemical looping and the numerical simulation of chemical looping based processes for the poly-generation of decarbonized energy vectors. Concerning the experimental work a particular focus lies on the development of efficient materials with a high loading of the active compound, fast kinetics and tolerance to typical impurities. Advanced preparation and analytical characterization techniques are used to develop such materials. The numerical simulation of chemical looping-based energy conversion architectures aims to provide in-depth technical, economical and environmental assessments of the processes. The techno-economical analysis is based on detailed experimental measurements and mathematical models for the looping reactors and process flow models for the entire process chain.

### Expected results

The results obtained in this project will guide the design of energy efficient conversion methods and the preparation of multi-functional materials for chemical looping based poly-generation schemes. The original research results are disseminated by publication in reputable journals (e.g. Energy, Journal of Cleaner Production, International Journal of Hydrogen Energy etc.) as well as international conferences (e.g. Conference on Chemical Looping, AIChE Conferences, Conference of Greenhouse Gas Control). In addition, the project will contribute to the finalization of one PhD thesis.

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