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**Partner search**

**Date (20-07-20)**

* **(\*) Relevant topic in work programme**

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| **LC-GD-2-1-2020, Area 2: Clean, affordable and secure energy** |

* **Quick description of the project**

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| Production of hydrogen from renewable sources is one of the top priorities of the European Green Deal. Photocatalytic and photoelectrocatalytic processes using solar light are promising pathways to access hydrogen from aqueous solutions, including seawater. However, the feasibility of both processes depends on the performance and cost-efficiency of catalysts. Therefore, preparation of earth-abundant photocatalytic materials active under solar light is of great importance for sustainable energetics. Recently, we reported that noble metal-free stable and nontoxic Ti@TiO2 core-shell nanoparticles exhibit strong catalytic effect in hydrogen production under the joint effect of light and heat. This finding opens the opportunity to boost the efficiency of photocatalytic hydrogen production over earth-abundant catalysts using concentrated solar light. Today, photothermal materials are widely used for solar powered steam generation or seawater desalination rather than for heterogeneous photocatalysis. Our project focuses on the following principal goals: (i) development of cost effective photocatalysts based on nanosized titanium metal and titanium alloys without any precious metals for photothermal hydrogen production from seawater, (ii) modelling of the photothermal effect leading to hydrogen production, (iii) scale up of photothermal hydrogen production from seawater using solar light concentrators. Further optimization of the photothermal reactor will allow simultaneous hydrogen production and seawater desalination using the same technological units. These units could be integrated to floating or fixed-bottom substructures of renewable energy power generating systems. We are seeking the partners with an expertise in multiscale modelling of heterogeneous catalytic processes and scale-up of solar concentrators.  |

* **(\*) Do you intend to apply as? :**

**Participant : No**

**Coordinator : Yes**

**(\*) Either Description of the expertise requested (up to 1000 characters) - *specify which points of the "expected impact" of the call you are targeting***

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| The partners with the expertise in two areas are requested:1. Multiscale modelling of the heterogeneous catalytic processes. The biggest challenge is to overcome the problems related to coupling of charge transfer with dynamics of water and intermediate products diffusion at the surface of working catalysts. The goal of multiscale modelling is the prediction of photothermal efficiency and plant simulation for simultaneous photocatalytic hydrogen production and seawater desalination processes.
2. Scale-up of solar concentrators. The photocatalytic reactions based on photothermal effect require a different heating regime than classical thermochemical cycle operated at very high temperatures. Therefore, design of medium temperature solar concentrators adapted to the photocatalytic processes will be required.

**+ key words : solar systems, photocatalysis, photothermal processes, hydrogen, desalination** |

**Organisation information**

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| **Organisation and country:****Marcoule Institute for Separation Chemistry, ICSM, UMR 5257****Marcoule Research Centre, Bat. 426, BP 17171****30207 Bagnols-sur-Cèze****France** |
| **Type of organisation:****□ Enterprise □ SME □ Academic XResearch institute □ Public Body □ Other: Association** |
| **Former participation in FP European projects?****□ Yes X No** |
| **Web address:** **www.icsm.fr** |
| **Description of the organisation:****ICSM is a Joint Research Unit between CEA, CNRS, UM, and ENSCM, focuses on fundamental research in chemistry and physical chemistry, necessary for the rise of carbon-free energies in a world context of rarer natural resources.** |

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**(\*) –Mandatory**