



# HYDROSOL

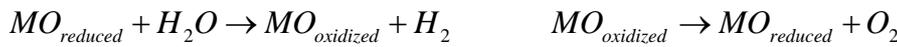
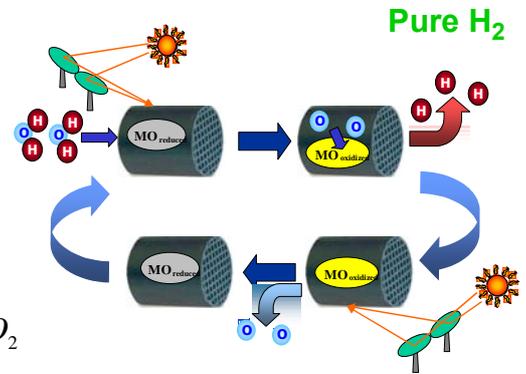


## Advanced Monolithic reactors for Hydrogen Generation from solar water splitting

C. Agrafiotis, S. Lorentzou, C. Pagkoura, A.G. Konstandopoulos, Aerosol and Particle Technology Laboratory, CErTH/CPeRI, Thessaloniki, GREECE (Coordinator)  
 Phone: +302310498192/498198; Fax: +302310498190, E-mail: agk@cperi.certh.gr, chrisagr@cperi.certh.gr  
 C. Sattler, M. Roeb, R. Klüser, N. Monnerie, P.M. Rietbrock, L. de Oliveira, Deutsches Zentrum für Luft- und Raumfahrt e.V., Solarforschung, GERMANY  
 P. Stobbe, Stobbe Tech Ceramics A/S, DENMARK  
 A. Steele, Johnson Matthey Fuel Cells Centre, UK

### Technology Concept

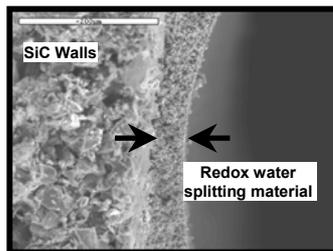
Solar Hydrogen production via two-step water splitting process, performed on monolithic honeycomb reactors capable of achieving high temperatures when irradiated with solar energy and coated with active redox pair materials capable of performing water dissociation and being at the same time reversibly reducible and oxidizable, so that complete operation (water splitting and redox material regeneration) can be achieved on a single solar monolithic energy converter.



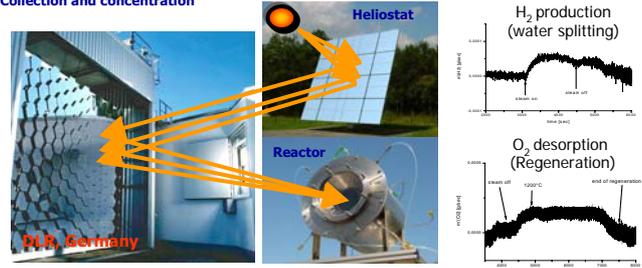
### Achievements

Active redox materials were synthesized, achieving conversion of water to Hydrogen of 80% at 800°C, capable of quantitative regeneration around 1100°C, and were successfully coated on ceramic monoliths capable of absorbing durably solar radiation.

The “proof-of-concept” was demonstrated: for the first time solar-aided Hydrogen production was achieved on a monolithic honeycomb reactor, operating in cyclic water splitting–regeneration mode

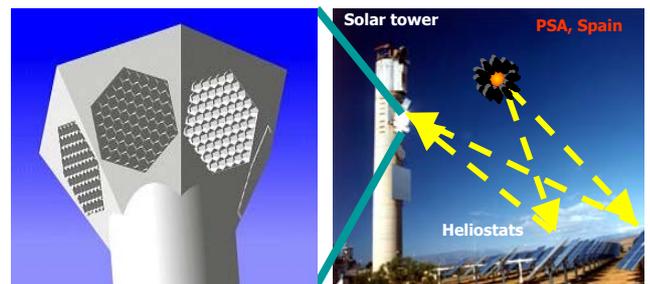
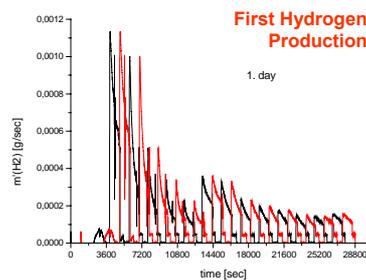


Collection and concentration



A “dual” reactor has been developed and operated for 40 cycles at various temperature levels between 800 - 1200 °C, achieving water splitting and redox material regeneration simultaneously.

Scale-up of the process and incorporation in solar tower facilities is scheduled.



### Prospects-Opportunities

- The production of “solar” hydrogen with new technologies creates new opportunities to many regions of the world which have a huge “solar potential” and can become local producers and exporters of energy.
- The technology can be exploited for Solar Hydrogen production from other sources e.g. natural gas.
- The technology is entirely within the scope and fully integrated into the “Maghreb - Europe Project”.

