



MATERIALS FOR A BETTER LIFE ...
14 – 17 APRIL 2019
NOVA UNIVERSITY OF LISBON

The Concentration of Solar Radiation, Materials and Decarbonisation of Energy Systems

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This presentation deals with the role of concentration technologies of solar radiation in the decarbonisation of the Portuguese energy system, and the growing importance of R&D in new materials for the success of such goal.

At the moment there is a public discussion about the path towards decarbonisation of our economy on the horizon that has been set for 2050, which makes extremely important to explain the role that those technologies may have, in face of the scientific and economic advances that have already been achieved. In fact, the remaining low level of general knowledge is relegating the solar concentration technologies to an unfair and ostensible second or third plan in the official documents that are being drawn.

On one hand, solar energy is the most important energy resource of the planet; and Portugal, in particular and in the European context, has the largest solar resource availability. On the other hand, at the macroeconomic level, it is crucial for our industry the possibilities of national incorporation that those technologies represent, which can actively contribute to the integrated and sustainable development of our country, if a future large-scale manufacturing activity is achieved for internal and external use.

The concentration of solar radiation has application both in the field of photovoltaic (PV) and in a large number of thermal applications. In both cases, it is of paramount importance the role of materials. They have experienced a great development, which is quite visible in PV, but less disseminated in the case of thermal applications. Nevertheless, it is equally noticeable this development in solar thermal technologies, most pronouncedly in those related to the high temperatures involved in the solar radiation concentration systems, which will be particularly addressed in this presentation.

These high temperatures are required for the increase in thermodynamic efficiency of electricity power plants, for the production of *solar fuels* such as synthetic gas or hydrogen, for example, or for the development of new materials. The R&D effort on these various scientific fronts and domains is focused on driving the technologies of solar concentration to increasingly higher levels of TRL, in order to improve the economic and financial performance of these systems - which are usually referred to as CST/CSP systems (Concentrating Solar Thermal / Concentrating Solar Power).

In this way, a brief synopsis of the current R&D effort will be made, highlighting the role of materials in this development, which covers virtually all components of concentration systems - both for electricity generation and for direct heat integration in industrial thermal processes. Those are the components of the Radiation Capture, Thermal Transfer, and Thermal Storage subsystems, all of them presenting requirements which are of particular importance in the future of CST/CSP technologies. The presentation will stress the development work that must be continued, and opportunities that may be of particular interest to the scientific community.

Presenting author: please, insert your full address and contact details (times new roman 12pt – normal)

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