Postdoctoral Position in materials science

Nanostructured High Entropy Oxides for Photocatalytic Green Hydrogen Production

Starting date: March 2023, **Duration:** 12 months
Gross Salary: 2200-2350 € *(after tax and social insurance)*

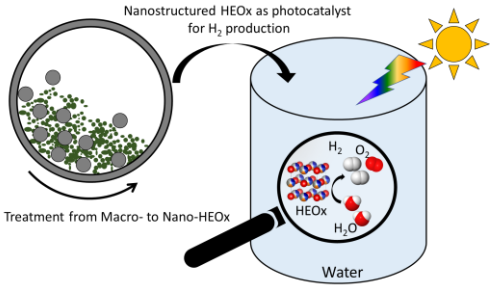
The objective of this postdoctoral project is to investigate the use of new high entropy oxides (HEOx) as photocatalysts to convert solar energy into hydrogen. The HEOx will be synthesized and downsized to the nanometric scale. Then their photocatalytic activity and optical properties will be measured to optimize the synthesis parameters (chemical composition, grain size …) for performance improvement. The project is supported by the Paris Ile-de-France Region in the framework of DIM MaTerRE

Context

Hydrogen is seen as the chemical fuel of the future. However, most of the hydrogen produced today is obtained from methane reforming. An emerging solution for the production of "Green Hydrogen'' is the use of photocatalysis of water. In this context, the development of efficient and low-costs photocatalysts is of great importance.
High entropy oxides (HEOx) were recently discovered by Rost *et al*. in 2015 *(Nat. Commun., 6, 2015 8485)*. They are obtained by a mixing of at least 5 cations randomly distributed in the cationic site. The thermodynamic stability is thus enhanced by the large entropy of configuration. The possibilities of cations combinations are nearly infinite, and a fine adjustment of physical and chemical properties can be expected. In response to the need of new photocatalyst, we propose to take advantage of this tunability to develop optimized photocatalysts. New HEOx phases will be synthesized as nanometric powder with bandgaps energies suitable for photocatalysis under visible light.

Tasks

- Synthesis of new HEOx
- Development of the downsizing treatment to get nanometric powder
- Study of the optical properties and photocatalytic activity depending on the chemical composition and grain size.



The synthesis will be performed at ICMMO whereas the photocatalytic activity will be studied at ICP

Candidate profile:

- PhD in materials science obtained within the last two years
- Experience in nanostructured materials synthesis, optical properties and/or photocatalysis
- Strong skills in oral and written communication
- Motivated, curious, autonomous

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