

PhD position to undertake a doctoral thesis in the development of peritectic compounds for thermal energy storage and the study of their corrosivity.

CIC energigUNE is a Basque energy research centre (<http://www.cicenergigune.com>) which mission is to play a leading role on the international stage in the field of energy storage technologies and contribute to the industrial competitiveness of Basque Country.

Fundación TECNALIA Research and Innovation (www.tecnalia.com) is the largest private non-profit applied research centre in Spain and the fifth in Europe, employing 1,378 people (164 PhDs) and with income of 102 Million € in 2013. The whole team at TECNALIA has one GOAL: to transform knowledge into GDP, meaning wealth to improve people's quality of life by generating business opportunities for industry.

We are now inviting applications for a shared PhD position between these two institutions, to develop a research in the field of Thermal Energy Storage.

Ph.D project description:

Thermal energy storage (TES) systems are valuable components in most energy systems and could be an important tool in achieving a low-carbon future. These technologies allow for the decoupling of energy supply and demand, thus providing a valuable resource to improve energy use efficiency.

The thesis is based on a novel idea which consists in using chemical compounds formed during peritectic transitions as TES materials. The term peritectic refers to reactions in which a liquid phase (L) reacts with at least one solid phase (α) to form a new solid phase (β). The reaction is reversible and takes place at constant temperature. Compared to the state-of-the-art in TES, peritectic compounds could provide outstanding volumetric energy density using a simple system technology, which makes them especially attractive for achieving a cost-effective TES. However, the development of peritectic-based TES technology is still at very early stage mainly due to the novelty of the idea.

Therefore, the goal of this thesis is twofold. On one hand, the design and development of materials based on peritectic compounds suitable for TES applications, and on the other hand, the study of how these new materials interact with the structures that contain them in industrial applications, such thermal storage tanks, pipes, ducts and so on.

In order to achieve the first goal, different kind of carbon/peritectic composite materials will be studied to solve problems that may appear in the peritectic formation process, mostly related to reversibility and energy density (e.g. phases separation phenomena or slow transformation kinetics).

The second goal will be dedicated to carry on studies of compatibility of the new TES material with the alloys that are most commonly employed in the manufacturing of structures and components in contact with TES. A thoroughly study of corrosion and degradation processes of new materials in contact to different alloys with will be performed, and new innovative solutions based on protective barriers will be tested, in order to determine the techno-economic viability of such solutions.

A shared thesis between a fundamental research center as CIC energigUNE and an applied research center as Tecnalia, will allow the PhD student to have a complete view of how innovative materials and solutions are applicable to forthcoming industrial needs.

Qualification requirements:

We are looking for candidates preferably with a master degree in Physics, Physic-Chemistry, Materials Engineering or other scientific disciplines in a related field. The candidate should be a good team player who can collaborate with other scientists.

A highly motivated person with interest to the investigation and innovation will be incorporated into multidisciplinary team. He/She should also demonstrate strong capabilities to organize the work in order to achieve deadlines and project targets.

Good knowledge of English would be appreciated and able to commute between Vitoria and San Sebastian (Spain).

Application:

All applicants are invited to submit a detailed curriculum vitae and a motivation letter through the webpage of CIC energigUNE (<http://www.cicenergigune.com>). The selection process ends once a candidate is selected.