Expression of Interest

Contact Person/Scientist in Charge

- **Name and surname:** J. Enrique Julia
- **Email:** enrique.julia@uji.es

Universitat Jaume I de Castellón (UJI)

Department / Institute / Centre

- **Name:** Department of Mechanical Engineering and Construction / Universitat Jaume I de Castelló (UJI)
- **Address:** Avenida de Vicent Sos Baynat, s/n, 12006
- **Province:** Castellón

Research Area

- Chemistry (CHE)
- Information Science and Engineering (ENG)
- Physics (PHY)

Brief description of the institution:

Universitat Jaume I de Castellón (UJI), is the public university in the north of the Valencian Community, created on 1991. It has obtained the 500+ Golden Seal of European Excellence by the Excellence in Management Club.

The UJI offers 31 undergraduate degrees, 19 postgraduate studies, 43 official postgraduate master's degrees, 15 UJI-specific master's degrees and has 14,000 students. It counts on about 1000 researchers distributed in 27 university departments and 12 research institutes.

The UJI is the third University and fifth entity of the Valencian Community, including companies and other research institutes, which have obtained more money from the European Research and Innovation Framework Programmes. Currently it is involved in 26 ongoing European research actions, including several

European programmes (such as H2020, FP7, Interreg, SUDOE, LIFE, etc.).
The UJI offers modern research facilities among which stand out the different scientific structures that support research, such as the Central Scientific Instrumentation Service, the Animal Experimentation Service (SEA) or its prestigious Library.

A specific program for newcomers helps researchers with the administrative procedures in order to become familiar with the facilities and standard practices, as well as an accurate integration. Moreover researchers can access additional services such as Sports Service, The University Residence, the Language Learning Centre (CAL) that offers an annual program of languages for foreigner researchers and the health centre available to the University community.

Brief description of the Centre/Research Group (including URL if applicable):

Multiphase Flow Research Group (GFM) was stablished at Universitat Jaume I in 2004. Nowadays GFM consists of 5 Associate Professors, 2 postdoctoral fellows, 1 laboratory technician, 5 PhD students and 3 researchers. In the last 5 years, GFM has published more than 20 papers in high impact factor journals and it has obtained more than 300.000 euros in research funding in competitive calls and private research contracts with companies. Research topics of GFM are related with multiphase flows in thermal engineering applications. From 2009, one of the GFM research topics is the development, characterization and modelling of nanofluids (heat transfer and/or thermal storage fluids with enhanced thermal properties by the addition of nanoparticles) for high temperature applications (thermal oils and molten salts). In this research topic GFM has published several journal papers, book chapters and owns a patent. In addition, GFM is performing active research collaborations with different leading international institutions such as Institute for Optics (IT), University of Birmingham (UK) and Purdue University (US).

Project description:

Development of Hybrid Sensible-Latent Heat Transfer and Thermal Storage Nanofluids for High Temperature Applications.

The main objective of the project is to improve the thermal properties (thermal storage density and thermal conductivity) of molten salts used in high temperature applications by the use of self-Nanoencapsulated Phase Change materials (PCM, NePCM). The project proposes its use in both actual Concentrated Solar Thermal Power (CSP) applications (nitrate salts) and future CSP applications (carbonate salts). Molten salts are widely used in CSP plants and both Heat Transfer Fluids (HTF) and thermal storage (TES) fluid. Nanoparticles can improve the thermal properties of HTFs (nanofluids) and, in molten salts, to improve its thermal conductivity as well as its thermal storage density. This project proposes the use of NePCM designed for high temperature conditions and dispersed and stabilized into molten salts. In this way, it would be possible to increase the thermal storage density due to the increment of the specific heat by the use of the alignment of salt ions caused by the NePCM surface as well as by the contribution of the latent heat of the NePCM cores. As NePCMs, the project propose to use aluminium and its alloys with copper, zinc and

silicon (melting temperature between 385 ºC and 660ºC) self-encapsulated by its metallic oxide shell. Through this project it will be possible to improve by 20% the thermal conductivity and by 50% the thermal storage density of actual molten salts. In order to get this goal, it will be needed to develop new synthetization, stabilization and characterization techniques applicable to nanofluids at high temperature conditions.

Applications

Please submit the next documentation:

- CV

- At least, a reference letter

Deadline: 30/06/2016