

**Post-Graduate School of Chemical Engineering  
Federal University of São Carlos, São Carlos - SP, Brazil**

**Post-Doctorate Grant**

In the context of the research project entitled:

“Experimental characterization and numerical modelling of air filter media performance in removing nano-sized particles”

Funding Agency: CAPES ([www.capes.gov.br](http://www.capes.gov.br))

Monthly amount of grant: BRL 4100.00

The research project is three years long and is already in progress (March 2014 – February 2017).

The postdoc grant can be awarded also for a shorter period of time (e.g. one year).

**1. Summary and goals of the research project**

Filtration of airborne nano-particles increased its importance since the explosion of interest for nanosized materials. Nanosized structures can be used in smart materials, electronic circuits and for improving human health. Their manipulation and production raises questions about potential health risks for the people involved. Apart from human health impact, some industries, like pharmaceutical and semiconductor ones, require very clean environments and need to use high efficiency air filters. Nano-particles play a role also in the air surrounding us. They come from non-industrial sources like cigarette smoke, particulate matter originated from chemical reactions in the atmosphere, and condensed vapors. The understanding of the behavior of fibrous air filter media, especially in the case of nano-sized aerosols, will bring benefits not in the field of nanotechnology but also in the design of air filter elements and media. The optimization of air flow resistance will allow the development of filters with reduced energy consumption, while at the same time the environmental pollution could be reduced.

The research project is being developed by the research group for environmental control at the Chemical Engineering Department of Federal University of São Carlos together with Prof. Paolo Tronville from the Department of Energy of Politecnico di Torino (Turin, Italy).

The overall objective of the research project is to develop and validate the modeling and simulation of the performance of filter media in terms of air flow resistance and nano-particle removal efficiency. For achieving this general goal, some specific objectives need to be accomplished:

- Experimental characterization of filter media through image analysis and measurement of pressure drop and removal efficiency;
- Design and implementation of computational procedures for the simulation of the dynamics and capture of nano-particles using commercial CFD and Lattice Boltzmann codes.

## **2. Tasks of the grant recipient**

- Project management (interaction with CAPES, planning and monitoring the progress of the work, organization and presentation of semiannual workshops to assess the progress of the project)
- Supervision and monitoring of students (undergraduate, graduate and doctoral) in charge for the execution of experiments and implementation of computational routines in JavaScript, C++ and Fortran to be used in CFD and Lattice Boltzmann codes.
- Writing scientific articles and annual reports

## **3. Expected capabilities of the grant recipient**

- Doctorate in science or technology area
- Attitude to manage and integrate research teams
- Fluency in English
- Notions of good laboratory practice (not necessarily chemical engineering)
- Knowledge involving CFD and/or Lattice Boltzmann simulation

The lack of any of the above items (except the first one) does not exclude the candidate.

## **4. Application procedure and selection of grant recipient**

The applicant must submit to the email addresses [jargon@ufscar.br](mailto:jargon@ufscar.br) and [paolo.tronville@polito.it](mailto:paolo.tronville@polito.it) the following items:

- scientific Curriculum Vitae (in English or Portuguese);
- a letter of recommendation (in English or Portuguese);
- a cover letter (in English) where the candidate should report his motivation for the present work and indicate the start and end date of availability.

The documentation above must be received by 30<sup>th</sup> September 2014.

The result of the selection process will be communicated on 7<sup>th</sup> October 2014 by email to all candidates. The items contributing to the evaluation of the candidate are listed above. They should be highlighted in the candidate's CV. The last item (knowledge in simulation) will be given a higher weight. Additionally, the applicant's date of availability and the intention to be part of the team until the end of the project will be taken into consideration. Preference will be given to those candidates who can start working in October/November 2014 and committing to be part of the research team until the end of the project.