




Company  
Description

BCAM is the research center on applied mathematics created with the support of the Basque Government and the University of the Basque Country, which aims to strengthen the Basque science and technology system, by performing interdisciplinary research in the frontiers of mathematics, talented scientists' training and attraction, so the excellence of our results are recognized by the Society.

## Information

 Deadline: 2020-01-08  
 Category: Business  
 Province: Bizkaia

 Country: Basque Country  
 City: Bilbao

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## Main functions, requisites &amp; benefits

## Main functions

Mesoscopic Fluid Dynamics Modelling and Simulation of Espresso Coffee Extraction Applications are invited for a postdoctoral position in mesoscopic modelling of espresso coffee extraction at the CFD group (BCAM) in collaboration with the Illycaffè. The percolation of hot water through ground coffee represents a complex thermo-fluid dynamics process where particulates and aromatics migrate from the grains into the brew. From a coffee cup quality point of view it is necessary to model accurately the mass transfer occurring during the process, focusing on the solubilization of key odorant and taste-wise compounds from the roasted coffee phase. In fact, distinct compound kinetics generally lead to an altered balance in the final cup depending on extraction times, ground coffee granulometry, applied pressures and temperatures resulting, finally, in a highly variable sensorial experience. The goal of this project is to use and further develop an existing simulation framework (based on Smoothed Particle Hydrodynamics and Dissipative Particle Dynamics techniques) to control and engineer coffee flavors by 'virtually' monitoring the balance of specific key-odorant or taste-actives compounds in the beverage under unexplored flow processing conditions. The postdoctoral candidate will work under the supervision of Ikerbasque Prof. Marco Ellero (CFD group, BCAM) on the developments and use of mesoscopic particle-simulation methods to better understand the mesoscopic extraction kinetics. He/she will also interact closely, both with the Illycaffè R&D Department in Trieste, Italy (Dr. Luciano Navarini), and with experimental groups at the College of Engineering (Swansea University UK) where X-ray micro-CT techniques will be used to morphologically characterize the ground coffee microstructure.

## Requisites

The preferred candidate will have: Background in fluid mechanics, rheology, soft matter, particulate systems or complex fluids. Experience in modelling and simulation using particle methods such as smoothed particle hydrodynamics (SPH), dissipative particle dynamics (DPD) or molecular dynamics (MD) is required. Knowledge of C/C++ or Fortran programming languages is required. Experience in parallel programming for HPC is desirable. Promising young researchers. Applicants must have their PhD completed before the contract starts. PhD degree preferable in Chemical/Mechanical Engineering Good communication and interpersonal skills. Ability to effectively communicate and present research ideas to researchers with different background (e.g., mathematicians and engineers). Ability to clearly present and publish research outcomes in spoken (talks) and written (papers) form. Good command of spoken and written English.