

NTNU - kunnskap for en bedre verden

Ved NTNU, Norges teknisk-naturvitenskapelige universitet, skapes kunnskap for en bedre verden og løsninger som kan forandre hverdagen.

Faculty of Natural Sciences
Department of Chemical Engineering

PhD position in modeling of fluid particle coalescence

A PhD position is available at the Department of Chemical Engineering, NTNU for research work within the Environmental Engineering and Reactor Technology group. The position is devoted to the modeling of fluid particle coalescence. The appointment has a duration of 3 years with the possibility of until 1 year extension with 25% teaching duties in agreement with the department. The position is financed by the Research Council of Norway and has a special responsibility for the project "A Multidisciplinary Approach to Characterize Coalescence in Petroemulsions".

Information about the Department

The current research fields at the Department includes biorefinery and fiber technology, catalysis, colloid and polymer chemistry, environmental engineering and reactor technology and process systems engineering. Information about the department is available on the Departments homepage: <http://www.ntnu.edu/chemeng>. Further information is available at: <https://www.ntnu.edu/chemeng>

Job description

Fluid particle coalescence is taking place in many industrial multiphase process units and in nature. Improved understanding of the fluid particle coalescence phenomena is required in order to develop models and optimize the design and performance of such process units.

This research project consist of three work packages. We will use a) experiments, b) molecular dynamics simulation, and c) macroscopic film drainage models, to describe the film drainage and interphase rupture mechanisms in the coalescence processes. The PhD candidate employed in this position will be responsible for the theoretical task in work package c) deriving so-called jump conditions (a kind of boundary conditions) connecting the dispersed phase fluid and the continuous phase fluid at the interfaces from first principles for viscous and non-Newtonian interfaces. This theoretical work involves differential geometry, rheology and tensor analysis. Based on the resulting jump conditions, the candidate will employ lubrication theory (thin film analysis) to describe the film drainage and/or instantaneous coalescence phenomena in emulsions. The effects of interface rheology on the film drainage and rupture phenomena will be investigated at the level of individual emulsion droplets in stagnant fluids. The model framework may be extended to turbulent flows.

In the remaining two work packages the researchers in the project will provide necessary information required for the application of the film drainage model to relevant systems.

In this position it is possible to have a short research period abroad at our collaborating universities.

Detailed information on our PhD programs is found at: <http://www.ntnu.edu/nt/research/phd>

Qualifications

The applicant must have an MSc (or equivalent) in chemical engineering, fluid mechanics, physics, nanotechnology, mathematics or related disciplines, and a documented background in modeling, model implementation and theory relevant for this project. Experience in modeling work including differential geometry and tensor analysis is considered an advantage.

The successful candidate should be creative, independent with a strong ability to work problem oriented. He/she should also enjoy interdisciplinary research and take keen interest in learning and working in teams.

The regulations for PhD programs at NTNU state that the applicant must have a master degree or equivalent with at least 5 years of studies and an average grade of A or B within a scale of A-E for passing grades (A best). Candidates from universities outside Norway are kindly requested to send a Diploma Supplement or a similar document, which describes in detail the study and grade system and the rights for further studies associated with the obtained degree: http://ec.europa.eu/education/tools/diploma-supplement_en.htm

The position requires spoken and written fluency in the English language.

Terms of employment

The appointment of the PhD fellows will be made according to Norwegian guidelines for universities and university colleges and to the general regulations regarding university employees. Applicants must agree to participate in organized doctoral study programs within the period of the appointment and have to be qualified for the PhD-study.

NTNU's personnel policy objective is that the staff must reflect the composition of the population to the greatest possible extent.

The position as PhD is remunerated according to the Norwegian State salary scale. There is a 2% deduction for superannuation contribution.

Further information can be obtained from professor Hugo Atle Jakobsen, Department of Chemical Engineering, NTNU, Tel. +47 735 94132, E-mail: hugo.a.jakobsen@ntnu.no

The application

Applications with CV, certificates from both Bachelor and Master, possible publications and other scientific works, copies of transcripts, and reference letters should be submitted.

Applications must be submitted electronically through www.jobbnorge.no.

Applications submitted elsewhere will not be considered.

The reference number of the position is: NT- 59/17

Application deadline: 2017-05-02

Jobbnorge-ID: 136187, Søknadsfrist: 02.05.2017, Intern ID: NV-59/17

NTNU - knowledge for a better world

The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life.

PhD position in Biotechnology

A PhD position is available at the Department of Biotechnology and Food Science. The appointment has a duration of 3 years with the possibility of until 1 year extension with 25% teaching duties in agreement with the department. (To undertake the teaching duties it is a requirement that the candidate speaks Norwegian or another Scandinavian language).

The position is financed by the Research Council of Norway and has a special responsibility for the project "A Multidisciplinary Approach to Characterize Coalescence in Petroemulsions".

Information about the department

Currently the Department of Biotechnology and Food Science has 50 permanent employees, 35 in scientific positions and 15 in technical/administrative positions. Around 35 PhD research fellows and 10 postdoctoral researchers are currently appointed at the department. The research activity at the department has a broad focus and covers many areas within biotechnology and food science. Further information is available at: <http://www.ntnu.edu/ibt>

Job description

Increased insight into the interactions occurring between emulsion droplets is important to a range of applications from the food and pharmaceutical industries to oil recovery and mineral flotation. These interactions are often modified by the adsorption at the oil-water interface of surface-active species, in order to meet functional requirements of the emulsions. Irrespective of the application area of the emulsion, improved understanding of the fluid particle coalescence phenomena is beneficial.

This research project consist of three work packages. We will use a) experiments, b) molecular dynamics simulation, and c) macroscopic film drainage models, to describe the film drainage and interphase rupture mechanisms in the coalescence processes. The PhD candidate employed in this position will be responsible for the theoretical task in work package a), more precisely the use of the ultra-sensitive force probe optical tweezers as well as microscopic imaging to study coalescence in emulsions. The aim is to study colloidal stability at the level of individual emulsion droplets by means of directly observing artificially induced collisions or the collision of droplets moving freely in solution. The experiments will shed new light on the events leading to coalescence of emulsion droplets and how this process depend on parameters such as emulsion drop impact upon collision, surfactant type and concentration, ionic strength of the solution as well as deformation and the size of the contact region of the two droplets prior to coalescence. The experimental data provided will be used to validate and integrate molecular simulations findings and mathematical model predictions obtained by other researchers involved in the project.

In this position it is possible to have a research period abroad at our collaborating universities.

Detailed information on our PhD programs is found at: <http://www.ntnu.edu/nt/research/phd>

Qualifications

The applicant must have an MSc (or equivalent) in biotechnology, physics, chemical engineering or related disciplines, and a documented background in experimental work relevant for the project. Background in microscopy or oil emulsions will be considered an advantage.

The successful candidate should be creative, with a strong ability to work problem oriented. He/she should also enjoy interdisciplinary research and take keen interest in learning and working in teams.

The regulations for PhD programmes at NTNU state that a Master degree or equivalent with at least 5 years of studies and an average grade of A or B within a scale of A-E for passing grades (A best) for the two last years of the MSc is required. Candidates from universities outside Norway are kindly requested to send a Diploma Supplement or a similar document, which describes in detail the study and grade system and the rights for further studies associated with the obtained degree:

http://ec.europa.eu/education/tools/diploma-supplement_en.htm

The position requires spoken and written fluency in the English language. Applicants from non-English-speaking countries outside Europe must document English skills by an approved test. Approved tests are TOEFL, IELTS and Cambridge Certificate in Advanced English(CAE) or Cambridge Certificate of Proficiency in English (CPE).

Terms of employment

The appointment of the PhD fellows will be made according to Norwegian guidelines for universities and university colleges and to the general regulations regarding university employees. Applicants must agree to participate in organized doctoral study programs within the period of the appointment and have to be qualified for the PhD-study.

NTNU's personnel policy objective is that the staff must reflect the composition of the population to the greatest possible extent.

The position as PhD is remunerated according to the Norwegian State salary scale. There is a 2% deduction for superannuation contribution.

Further information can be obtained from associate professor Marit Sletmoen, Department of Biotechnology and Food Science , NTNU, Tel. +47 735 98694, E-mail: marit.sletmoen@ntnu.no

Further information about the Department can be found at <http://www.ntnu.edu/ibt>

The application

Applications with CV, certificates from both Bachelor and Master, possible publications and other scientific works, copies of transcripts, (copies of documentation on English language proficiency test) and reference letters should be submitted.

Applications must be submitted electronically through www.jobbnorge.no.

Applications submitted elsewhere will not be considered.

The reference number of the position is: **NV- 55/17**

Application deadline: **20.04.2017**

Jobbnorge-ID: 136083, Søknadsfrist: 20. april 2017