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

# PhD position in Rational Alloy Design: Physical Metallurgy (PhD3)

A PhD position is available at the Department of Materials Science and Engineering. 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 NTNU initiative NTNU Digital Transformation and is a part of the project Rational Alloy Design - ALLDESIGN, and has a special responsibility for the sub-project Multiscale microstructural modelling.

## Information of the ALLDESIGN project

The primary objective is to create a digital materials design platform for intermetallic alloy design. The project focuses on aluminium-based alloys, which are of great importance for the Norwegian industry. ALLDESIGN will investigate the physical processes behind slow-diffusion precipitation phenomena starting from atomistic scale and in silico. Our goal is to develop efficient theoretical methods to understand materials properties at different length and time scales and to limit costly trial-and-error measurements in the laboratory. Such output can considerably help in materials screening and finding optimal thermochemical treatment conditions. Complementary to the theoretical work will be experimental high-resolution characterization (including development of data processing algorithms) and validation of the theoretical results. Finally, the data from the multiscale modelling approach will be used for digitalization of the alloy manufacturing process in the newly invested 3D stretch-bending machine. The project involves a simultaneous recruitment of 1 post-doctoral fellow and 4 PhD students in complementary research areas within the same NTNU digital transformation call.

## Job description

The theme of the PhD research is modelling and simulation of microchemistry, microstructure and texture during thermomechanical processing of aluminium alloys and microstructure-processing-property relationships. The relevant models couple closely to the atomistic level (PD1), through their need for accurate data on e.g. diffusivities, interfacial energies, and new and improved models for the nucleation of precipitation, precipitate phases, their stability and intrinsic properties. Output will be model-based constitutive equations (e.g. stress-strain) to be used in advanced continuum models (PhD4) to describe the formability and end-use properties of aluminium components.

We are seeking a person with good understanding of physical metallurgy with strong motivation and experience in modelling / simulations in materials science and engineering, preferably on topics related to aluminium.

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

## Qualifications

The applicant must have an educational background (MSc or equivalent) in materials science and engineering, metallurgy, physics, chemistry or equivalent and a strong background and experience within at least one of the following fields:

- Numerical/mathematical modelling and simulations of microchemistry and/or microstructure (e.g. sub-structure evolution during deformation, precipitation, recovery and recrystallization, and/or grain growth and related properties)
- Crystal and/or continuum plasticity
- Skills in model implementation/programming in Fortran, C, Python or similar computer languages.

Experience with advanced nano-/microstructure characterization techniques (e.g. SEM, TEM, DSC, X-rays) as well as various methods for mechanical testing will be considered as 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](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 professor Knut Marthinsen, Department of Materials Science, NTNU, Tel. +47 735 93473, E-mail: [knut.marthinsen@ntnu.no](mailto:knut.marthinsen@ntnu.no)

## Information about the department

The Department of Materials Science and Engineering is Norway's leading institution for materials science and engineering. The department includes a

range of fields in physical and process metallurgy, with a focus on light metals and silicon, including solar-grade silicon, corrosion, electrochemical energy technology, inorganic materials, ceramics and nano-structured materials.

Further information is available at: <http://www.ntnu.edu/ima/>

#### **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](http://www.jobbnorge.no)

Applications submitted elsewhere will not be considered.

The reference number of the position is: NV-61/18

**Application deadline: 27.5.2018**

Jobbnorge-ID: 151436, Søknadsfrist: Søknadsfristen er gått ut