



Postdoctoral researcher in atom probe tomography (APT) supporting the design of green steel with excellent properties

Postdoctoral position

The Unit of Properties at the Department of Materials Science and Engineering, KTH Royal Institute of Technology, seeks a postdoctoral researcher for a two year position in atom probe tomography (APT). The Hultgren Laboratory (www.kth.se/hultgrenlab), a central research facility at KTH, placed at the MSE Department, recently established a CAMECA EIKOS-UV APT in the laboratory and this postdoctoral researcher is recruited to further strengthen the APT research on steels. The postdoctoral researcher will conduct their own research relating microstructural features such as precipitation, segregation, impurities and develop a protocol for hydrogen mapping in high strength steels. These aspects are key in developing the next generation green steel. The post-doc will collaborate with other researchers in the Unit and also with industrial partners. Furthermore, the position also means that the postdoctoral researcher will be part of the Hultgren Lab APT team and support other researchers and students with APT expertise on about 10% of their time.

Background

The development of novel high-performance green steels is currently in the limelight due to the necessary transformation towards sustainability. Heavy plate steel is important in tools used e.g. in forming of other materials. However, thick plates suffer from insufficient through-thickness toughness. This challenge becomes even more pronounced in fossil-free steels due to e.g. hydrogen embrittlement (HE), considering that the steels will be exposed to hydrogen in production and emerging applications. Hence, steels must become more resistant towards HE by improving through-thickness properties. This can be achieved efficiently by transitioning from the current trial-and-error based materials development to a computationally guided process. In the present project we will implement our computational materials design framework, including advanced material characterization, to develop an optimized alloy composition and heat treatment for a heavy plate tool steel with unprecedented through-thickness properties. Atom probe tomography is a key part of this work in order to elucidate the effects of precipitation, segregation, impurities and hydrogen on the mechanical properties and to understand process-structure correlations to be able to alleviate certain toughness degradation phenomena. The project will serve as a proof-of-concept for the computationally guided design methodology that we have developed over the past few years. The framework has transformative potential for efficient development of high-performance green steel in general.

Details of the position

Type of employment: Scholarship, 1+1 year, 300 000 SEK/year tax-free.

Starting day: according to agreement.

Placement: Stockholm, Sweden

Last application date: Until position filled.

Supervisors and contacts

Prof. Peter Hedström (pheds@kth.se), Head of Unit of Properties

Dr. Alexander Dahlström (adahlstr@kth.se), responsible APT Hultgren Lab, Unit of Structures

Dr. Tao Zhou (taozhou@kth.se), senior researcher, Steels, Unit of Properties

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