Master Thesis

Investigation of Grain Boundary Strengthening in Electrical Steels via Nanoindentation

Motivation:

Electrical steels (Fe-Si alloys) have tailored electromagnetic properties and are widely used in power transformers and electric motors to maximize their efficiency. It has been shown that the final microstructure has a strong influence on both the mechanical and electrical properties.

However, the quantitative contribution of grain boundaries to the overall mechanical properties of these materials is not yet well-understood.

This project will characterise the shape and orientation of grain boundaries in electrical steels using electron back-scattered diffraction (EBSD) and atomic force microscopy (AFM). Nanoindentation near grain boundaries will then be used to study the mechanical properties of these well-characterised boundaries.

Tasks:

- Metallographic preparation of samples by mechanical polishing and electropolishing
- Characterisation of grain boundary orientation by EBSD
- AFM to measure 3D structure and depth of grain boundaries
- Nanoindentation of grain boundaries to measure mechanical properties

What we offer:

- State-of-the-art materials analysis techniques
- Flexible working hours
- An enthusiastic group of co-researchers

The ideal candidate will:

- Be highly motivated to learn new skills
- Possess good English knowledge

Earliest projected starting date:

- May 2018

Contact:

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