

Mini thesis

Investigation on micro- and nanomechanical properties of DP steel

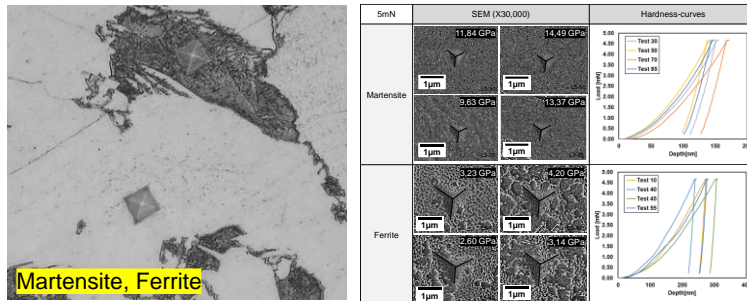


Institut für
Metallkunde und
Materialphysik

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Motivation:



High strength steels are widely used in the vehicle industry for reducing vehicle weight without deteriorating strength of the structural parts. In general, decrease of elongation and ductility are inevitably accompanied by strength increase of materials which results in difficulties during forming process at the manufacturing line. However, DP steel materials, which are composed of a hard martensite phase and a ductile ferrite phase, have high formability and sufficient strength due to its characteristic properties of each phase.

The aim for this project is to obtain reliable Vickers hardness results at the accuracy of nanoindentation by comparing and analyzing both measurements. Vickers hardness has the advantage of quick and easy specimen preparation but the reliability of the results is lower for measuring each phase due to its relatively large indenter size. On the other hand, accurate hardness values of each phase can be obtained from nanoindentation but it takes precise preparation for the measurements. In this study, a reliable measurement strategy will be an output which takes the both advantages of the simple Vickers hardness and accuracy of nanoindentation.

Tasks:

- Literature review: Characteristic property of DP steels
- Experimental tasks: Phase fraction analysis with metallography and mechanical property evaluation by micro- and nanoindentation

What we offer:

- Access to modern instruments to characterize mechanical properties and microstructures
- A young enthusiastic team of material metallography engineers

The ideal candidate will:

- Have a great interest in iterative validation between metallography results and material property measurements

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