Invitation à la soutenance publique de thèse de
Monsieur Olivier HUBERT
Master ingénieur civil en chimie et sciences des matériaux

Pour l’obtention du grade de Docteur en sciences de l’ingénieur et technologie

« The influence of diffusible hydrogen on the tensile properties of model high strength steels »

qui se déroulera
le mercredi 30 janvier 2019 à 16h15
Auditoire SUD09
Place Croix du Sud
1348 Louvain-la-Neuve

Membres du jury :
Prof. Pascal Jacques (UCLouvain), supervisor
Prof. Hervé Jeanmart (UCLouvain), chairperson
Prof. Thomas Pardoen (UCLouvain), secretary
Dr. Cédric Georges (Centre de Recherche Métallurgique, Belgique)
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Steel grades with levels of strength beyond 1000MPa and containing between 10 and 20% of retained austenite are increasingly developed notably for lightweight automotive applications requiring high levels of ductility. Unfortunately, these steels are potentially sensitive to hydrogen embrittlement (HE), an industrial issue encountered for high strength steels.

This work aimed at highlighting the interactions between diffusible hydrogen and model high strength steels. Martensitic (tempered or not) and bainitic microstructures (with different amounts of retained austenite) were processed, characterized and electrochemically charged with hydrogen.

An influence of the constituting phases on the hydrogen diffusion, trapping and release was demonstrated. A complete deconvolution analysis of the desorption peaks during charging or at saturation reveals that martensite and bainite both appear as low energy trapping sites for hydrogen while retained austenite plays the role of a high energy trapping site. Finally, the hydrogen influence on the tensile properties of the investigated microstructures was also scrutinized. The HE is important for martensitic microstructures and increases with increasing amounts of hydrogen or with lower crosshead speeds. The HE sensitivity of the bainitic microstructures seems to depend on both the level of strength of the uncharged specimens and on the TRIP effect. For the latter, it was indeed observed that a destabilization of retained austenite occurs in presence of diffusible hydrogen. A subsequent faster transformation into martensite is observed for bainitic microstructures containing noticeable amounts of retained austenite.