CONFERENCIA

19 de enero de 2018 12:00h

Sala de Conferencias del CENIM

Avda. Gregorio del Amo, 8 28040 Madrid

CENIM
Centro Nacional de Investigaciones Metalúrgicas

Predicting the formation and structure of martensite in steels

Enrique Galindo-Nava
University of Cambridge, Department of Materials Science and Metallurgy, Cambridge, UK

Dr. Enrique Galindo-Nava is a Royal Academy of Engineering Research Fellow in the Department of Materials Science and Metallurgy at the University of Cambridge (UK) since January 2017. He was a Research Associate in Cambridge between 2014 and 2016. He obtained his PhD in Materials Science from Delft University of Technology (Netherlands) on the development of a new theory of plastic deformation using thermodynamic and statistical principles.

He has two degrees, one in Mathematics by the National Autonomous University of Mexico, and another in Mechanical Engineering by the Panamerican University (Mexico).
His research interests are in the theory and simulation of metallic materials with focus in deformation mechanisms and microstructure formation. He has worked on multiple collaborative projects covering wide range of alloys, including steels, Ni-based superalloys, titanium, magnesium and aluminium. He also works extensively in microstructure-oriented metals processing, alloy design for resource efficiency, as well as hydrogen behaviour in advanced steels.

Resumen

Martensitic transformations have been the subject of extensive experimental studies over the past decades due to their technological importance in high-strength applications. However, existing theories describing the microstructure and its influence on mechanical properties are material-specific and are often empirically based. This work introduces recent efforts by the author and collaborators in understanding and predicting the microstructure and strength of martensite based on its mechanisms of formation. The hierarchical structure of lath martensite in low-C steels is described in terms of the transformation (Bain) strain, lattice distortions produced by C atoms and the number of crystallographic variants of the transformation. The results are linked with a thermodynamic description for the martensite start and finish temperatures across different metals, not only steels, where the transformation strain is shown to be the main factor controlling the driving force for martensite formation. The twinned structure of high-C steels is described by quantifying local C enrichment at twin boundaries, where it is rationalised that twins form to accommodate the large strains of higher C additions. Descriptions of the lath-dislocation, twin and grain boundary density in low- and high-C steels allow us to postulate a unified description of the hardness in martensitic steels for a wide range of compositions. The influence of retained austenite in the maximum strength of martensitic steels is also discussed.

Resumen disponible en **DIGITAL CSIC http://hdl.handle.net/10261/xxxxx**
Vicedirección de Comunicación y Formación. conforma@cenim.csic.es Telf.: 91-5538900 Ext.277

CENIM Centro Nacional de Investigaciones Metalúrgicas
GOBIERNO DE ESPAÑA MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD
CSIC Consejo Superior de Investigaciones Científicas