

PROJECT PARTNERS

CONTACT



The project brings together eleven partners from industry and academia and with expertise in the fields of theoretical modeling and experimental evaluation of hydrogen embrittlement.

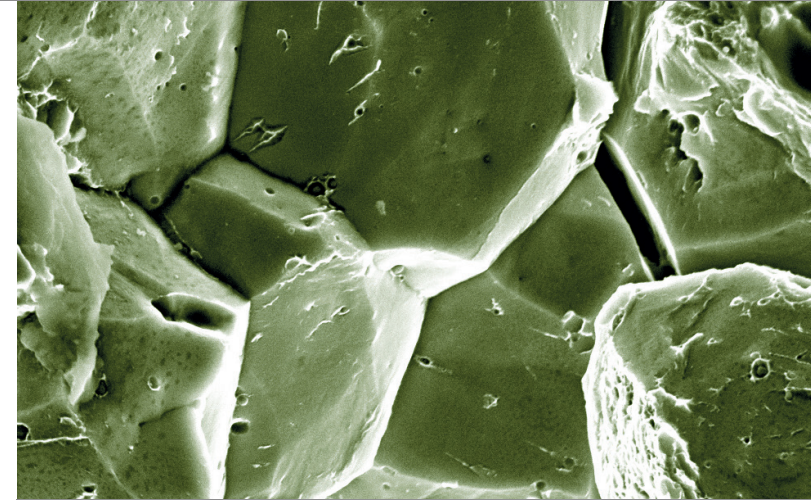


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MULTISCALE MODELING OF HYDROGEN EMBRITTLEMENT





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ABOUT MULTIHY

MultiHy is a collaborative research project funded within the 7th Framework Programme of the European Union under the theme “Nanosciences, Nanotechnologies, Materials and new Production Technologies”. The project has a combined budget of 5.3 mil € (including EU and partner contributions) and will run from the 1st of May 2011 until the 30th of April 2015.

The aim of MultiHy is to develop industrially-relevant computational models to assist in the evaluation of the susceptibility of complex materials to hydrogen embrittlement under realistic service conditions.

Hydrogen embrittlement is a serious and costly industrial problem that affects a diverse range of engineering materials in common environments. There is an urgent need to develop a better understanding of hydrogen embrittlement and to develop tools to evaluate the impact of hydrogen on the structural integrity of materials and components.

WHAT IS HYDROGEN EMBRITTLEMENT

Hydrogen embrittlement is the degradation of the mechanical properties of materials, usually manifested by sub-critical cracking, due to the presence of dissolved atomic hydrogen. All structural metals are susceptible to hydrogen embrittlement to some extent, with susceptibility generally increasing with yield strength. The hydrogen may come from a variety of sources: it may be either absorbed from the environment or produced by some chemical reaction on the surface of the metal (e.g. corrosion). Given the wide range of service environments in which this may occur, this represents a very serious and costly industrial problem.

OVERVIEW

MultiHy aims to develop advanced, industrially-relevant numerical models for hydrogen embrittlement. The primary focus of the project is the description of hydrogen transport in advanced materials with complex microstructures. By focusing on hydrogen transport the project aims to develop a robust, transferable methodology for predicting the susceptibility of materials to hydrogen embrittlement based on detailed microstructural information using computational methods. The models will be demonstrated by investigating the role of microstructure in three contrasting industrial case studies involving hydrogen embrittlement. The project’s aims will be achieved by development of a multiscale modeling framework that will enable the extraction and propagation of information pertaining to key microstructural features and defects from the atomistic up to the component scales, supported at all levels by dedicated experimental measurements.

