

Studies of hydrogen diffusion in steels with neutron radiography

Tuesday, 17 April 2012 09:30 (30 minutes)

The purpose of the present study is to show the feasibility of examining hydrogen desorption in steels using neutron radiography at the ANTARES facility of the FRM II research reactor, TU Munich. It has been shown that this method is appropriate for in situ determination of hydrogen desorption. Experiments were carried out in the temperature range from room temperature up to 260°C. Measurement was based on direct comparison between electrochemically hydrogen-loaded steel samples and hydrogen free reference samples at the same temperature. This enables the determination of hydrogen concentration as a function of time and temperature. Ex situ carrier gas hot extraction experiments using the same temperature–time profiles as the neutron radiography experiments have been used to calibrate the greyscale values of the radiographs to defined hydrogen concentrations. It can be stated that hydrogen desorption correlates with sample temperature.

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Session Classification: Material research / Metallurgy