Contribution ID: **112** Type: **Poster**

Characterization of VDM Alloy 718 CTP (DIN 2.4668 / UNS N07718) in different hardened conditions and the relationship between hardening phases and the alloy's hydrogen embrittlement susceptibility

Wednesday, 11 December 2019 15:30 (20 minutes)

The Nickel Alloy 718 was developed in the 60's for aerospace applications but due to its good corrosion resistance in sour gas application combined with the excellent strength properties, it found huge application in the Oil & Gas industry. Alloy 718 is a precipitation hardenable nickel-alloy enriched with amounts of niobium, molybdenum, titanium and aluminum, which combined grant the good properties.
The combination of nickel and aluminum drives to the precipitation of an ordered FCC Ni3Al phase, Gamma' . When combined with niobium, an body-centered tetragonal Ni3Nb phase precipitates, the Gamma". Both precipitates are responsible for the strengthening of the austenitic Gamma matrix.
Studies have been carried out in order to compare and better understand the hydrogen embrittlement resistance of the three different aging conditions of Alloy 718 listed in the API 6ACRA. Different commercial heats were age hardened under the standard ageing temperature range defined by the API 6ACRA in order to produce material with minimum 120 ksi, 140 ksi and 150 ksi yeld strengths.
The interaction of H with the microstructure has been evaluated by means of Slow Strain Rate Tests under cathodic polarization in order to calculate the loss of elongation in the material after exposure to aggressive environment, what characterizes the suscepbility to hydrogem embrittlement. A structural characterization was made by means of neutron diffraction and small angle neutron scattering techniques.

Primary author: BOTINHA, Julia (VDM Metals International GmbH)

Co-authors: Dr GEHRMANN, Bodo (VDM Metals International GmbH); Dr ALVES, Helena (VDM Metals International GmbH); GILLES, Ralph (Heinz Maier-Leibnitz Zentrum (MLZ), Advanced Materials, TU München); SOLIS, Cecilia; MUNKE, Johannes; FEOKTYSTOV, Artem; BARAN, Volodymyr

Presenter: BOTINHA, Julia (VDM Metals International GmbH)

Session Classification: Poster session

Track Classification: Materials Science