

## Electrochemical Corrosion Behavior of TC11 Alloy in Sulfate Solution at High Temperature and High Pressure

Lei Zha<sup>1, 2</sup>, Heping Li<sup>1,\*</sup>, Ning Wang<sup>1</sup>, Sen Lin<sup>1</sup> and Liping Xu<sup>1</sup>

<sup>1</sup> Key Laboratory of High-temperature and High-pressure Study of the Earth's Interior, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550081, P. R. China

<sup>2</sup> University of Chinese Academy of Sciences, Beijing 100049, P. R. China

\*E-mail: [liheping@vip.gyig.ac.cn](mailto:liheping@vip.gyig.ac.cn)

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TC11 alloy is a potential alloy for use in high temperature aggressive water environments. The electrochemistry and corrosion behavior of TC11 alloy is investigated in sodium sulfate solution at high temperature and high pressure using various in situ electrochemical techniques, i.e., open circuit potential (OCP), potentiodynamic polarization (PDP), and electrochemical impedance spectroscopy (EIS) measurements. The effect of sodium sulfate concentration, temperature, and pressure on the electrochemical corrosion behavior of the alloy has been explored. The results indicate that the increase of either concentration or temperature and pressure shift the value of the corrosion potential ( $E_{\text{corr}}$ ) for the alloy toward the negative direction, while increasing the values of corrosion current density ( $i_{\text{corr}}$ ) and corrosion rate ( $R_{\text{corr}}$ ). The values of oxide film resistance ( $R_f$ ) and charge transfer resistance ( $R_{\text{ct}}$ ) confirm these results. The EIS and polarization results are in good agreement with each other.

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**Keywords:** Titanium alloy; EIS; Corrosion; High temperature; High pressure

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