

Short communication

## Electrochemical Studies on the Corrosion of Electrically Conductive Sulfide Minerals in High Pressure Hydrothermal Fluids - a Case Study From Pyrite

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doi: 10.20964/2017.01.11

Received: 13 September 2016 / Accepted: 19 October 2016 / Published: 12 December 2016

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Electrochemical data concerning electrically conductive sulfide minerals submitted to high pressure hydrothermal fluids above 150 °C has not been reported in spite of its significance. In this work, electrochemical impedance spectroscopy (EIS) and Tafel studies of pyrite corrosion in pure water, 3.5% NaCl solution and 0.1 M sulfuric acid with 1796 kPa O<sub>2</sub> at 350 °C, 30 MPa were conducted, with the assistance of a self-designed three-electrode electrochemical measurement set-up that can operate in high pressure hydrothermal fluids. Results show that in pure water, 3.5% NaCl solution, and 0.1 M sulfuric acid with 1796 kPa O<sub>2</sub>, corrosion potential ( $E_{\text{corr}}$ ) is respectively -150, -334 and -752 mV, corrosion current ( $I_{\text{corr}}$ ) is respectively 1.44E-5, 1.95E-4 and 7.73E-3 A. The solid-liquid interface information at pyrite surface achieved by EIS measurements reveals an important reason of the difference between the values of  $E_{\text{corr}}$  and  $I_{\text{corr}}$  in the three studied fluids. The electrochemical studies in this work also provide a promising method for research into the corrosion of other conductive sulfide minerals in high pressure hydrothermal fluids.

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**Keywords:** Pyrite; high pressure hydrothermal fluids; Tafel; electrochemical impedance spectroscopy

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