In Situ Synchrotron Radiation GIXRD Study of Sweet Corrosion Scaling on Carbon Steel

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Sweet corrosion is one of the most prevalent forms of corrosion attack encountered in the oil and gas industry. Over the past few decades, extensive research has been carried out to gain mechanistic understanding of sweet corrosion, including elucidation of the composition and structure of corrosion scales. However, only few studies have investigated corrosion and film formation processes in a CO_2-containing environment by in situ grazing incidence x-ray diffraction (GIXRD) techniques. For this work, a custom-built electrochemical cell (E-cell) has been designed to incorporate both electrochemical and synchrotron radiation SR-GIXRD measurements. Sweet corrosion scales formed on pipeline steel were investigated using the SR E-cell at deaerated conditions and elevated temperatures (~80). The results will be presented and compared with ex situ GIXRD data.