Electronic Supplementary Material (ESI) for Faraday Discussions. This journal is © The Royal Society of Chemistry 2017

Supplementary Materials



Figure S1. (a) BSE image of film synthesized at 0.1 M sodium thiosulphate in CO_2 -saturated brine at room temperature, (b) corresponding EDS spectrum confirming the presence of Na, S and O along with Fe from substrate; (c) BSE image of film synthesized at 0.5 M sodium thiosulphate in CO_2 -saturated brine at room temperature (b) corresponding EDS spectrum coinfirming the presence of Na, S and O along with Fe from substrate, signal of Fe was less then the signal seen in (b), we speculated that this is because of high film thicknes.



Figure S2. Surface film synthesized at 0.5 M sodium thiosulphate in CO_2 -saturated brine at room temperature. Front views of ToF-SIMS depth profiles for O, S and Cl, respectively. Additional data to Fig.10 in the main text.



Figure S3. Raman spectra from surface film synthesized with 0.1 M sodium thiosulphate in CO_2 -saturated brine at room temperature. The spectra where taken at separate areas across the film-deposited steel substrate.



Figure S4. Raman spectra from surface film synthesized with 0.5 M sodium thiosulphate in CO_2 -saturated brine at room temperature. The spectra where taken at separate areas across the film-deposited steel substrate.



Figure S5. Infrared spectroscopy scectrum from surface film synthesized with 0.1 M sodium thiosulphate in CO_2 -saturated brine at room temperature.



Figure S6. Infrared spectroscopy scectrum from surface film synthesized with 0.5 M sodium thiosulphate in CO_2 -saturated brine at room temperature.



Figure S7. XRD data from surface film synthesized with 0.1 M sodium thiosulphate in CO_2 -saturated brine at room temperature. The tick marks indicate the diffraction peaks due to iron.



Figure S8. XRD data from surface film synthesized with 0.5 M sodium thiosulphate in CO_2 -saturated brine at room temperature. The tick marks indicate the diffraction pekas dues to iron (red), NaCl (blue), mackinawite (green), and $Na_2S_2O_3$ (brown).