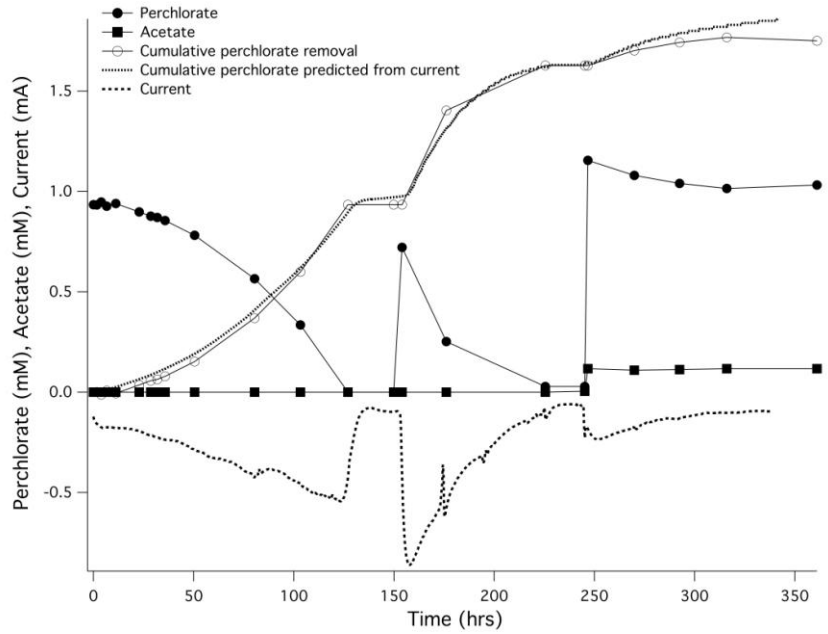
Figure S1.

Outlier reactors drew larger amounts of current than replicates, did not oxidize acetate, and a negligible current spike was observed – characteristics identical to lysate reactors. A) Outlier reactor from Figure 1 and B) Outlier reactor from Figure 3.



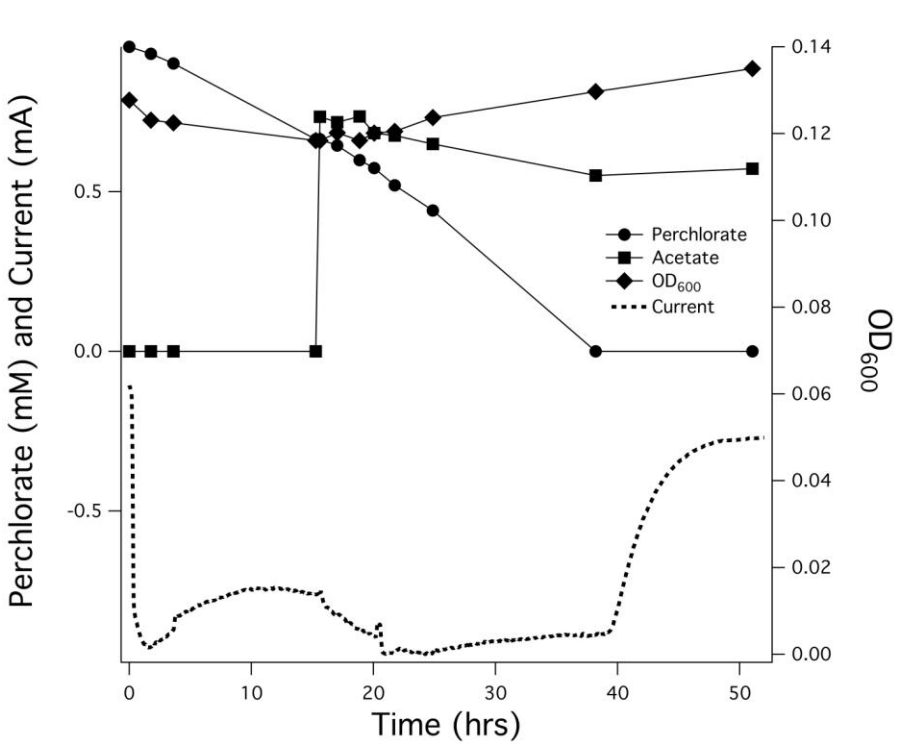


Figure S2.

Acetate addition to a washed cell suspension of *A. suillum* PS results in a cathodic current spike. Washed cells, pre-grown on 10 mM acetate and 10 mM perchlorate, were inoculated into a bioelectrical reactor poised at -500 mV vs SCE with 500 µM pre-reduced AH_2DS. The current spike before PS inoculation was a result of the initial electrochemical reduction of AQDS.

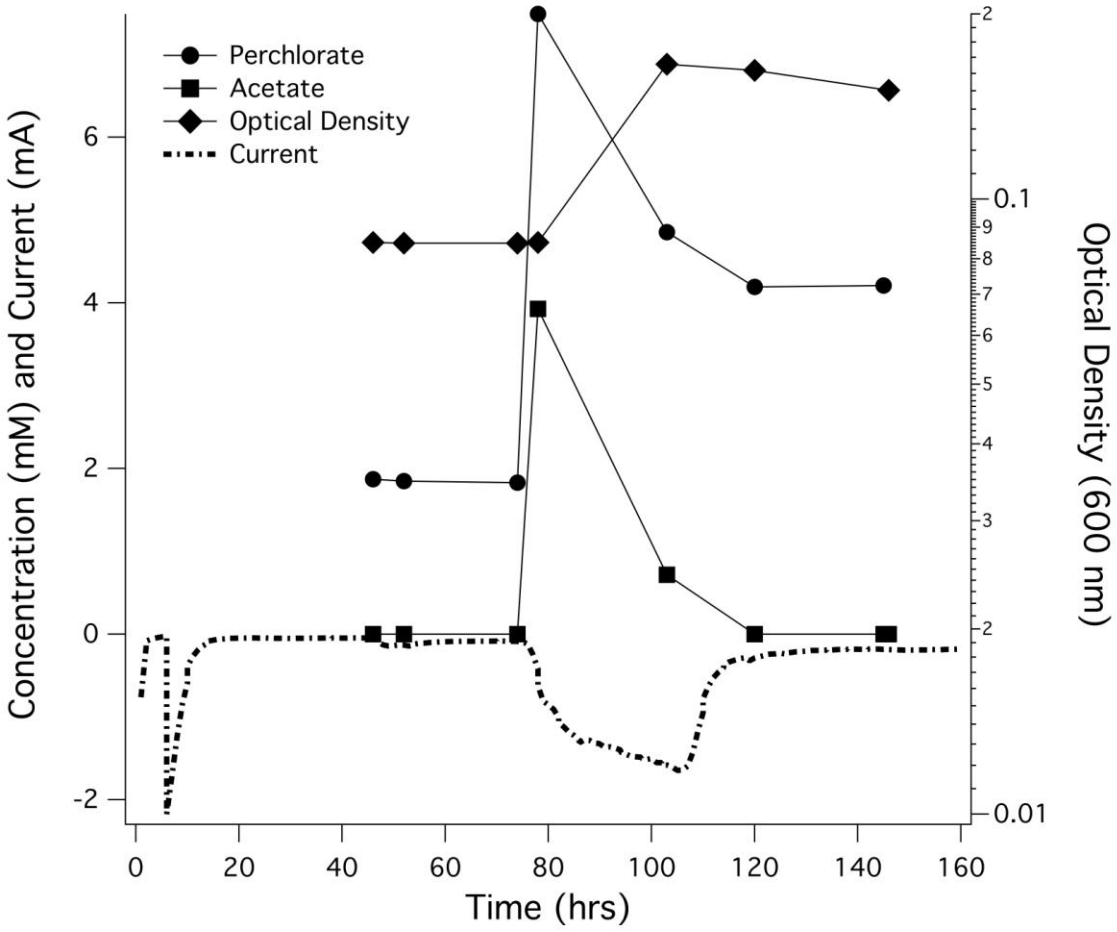
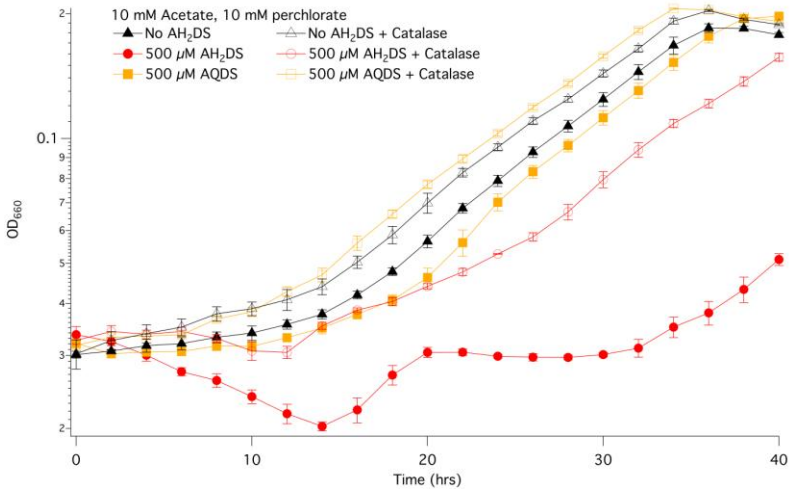
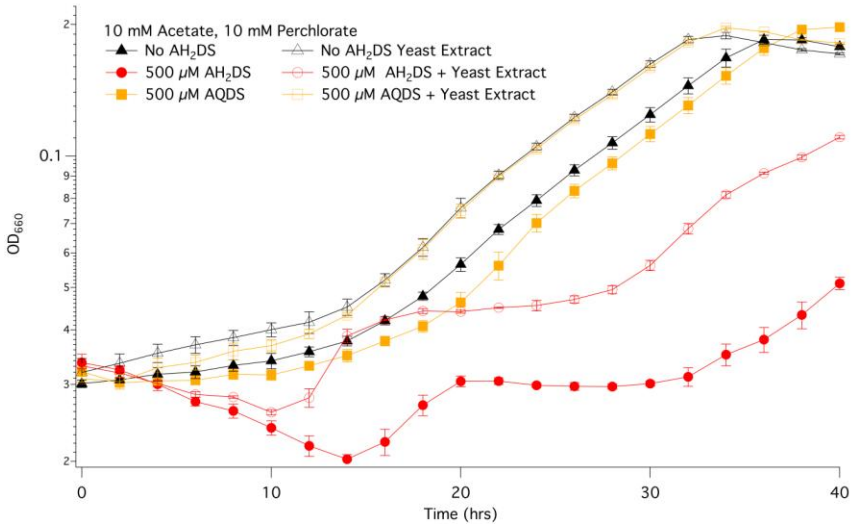


Figure S3.

Yeast extract and catalase decrease the growth lag of perchlorate reducing cultures, with the most profound effect seen in the presence of A_2HDS. Growth of *Azospira suillum* PS (10% inoculum) on acetate and perchlorate in the presence of A) 1500 U ml^{-1} catalase and B) 0.1 mg ml^{-1} yeast extract C) 1500 U ml^{-1} (0.032 mg ml^{-1}) active and heat-inactivated catalase D) 0.032 mg ml^{-1} BSA and 0.032 mg ml^{-1} catalase.

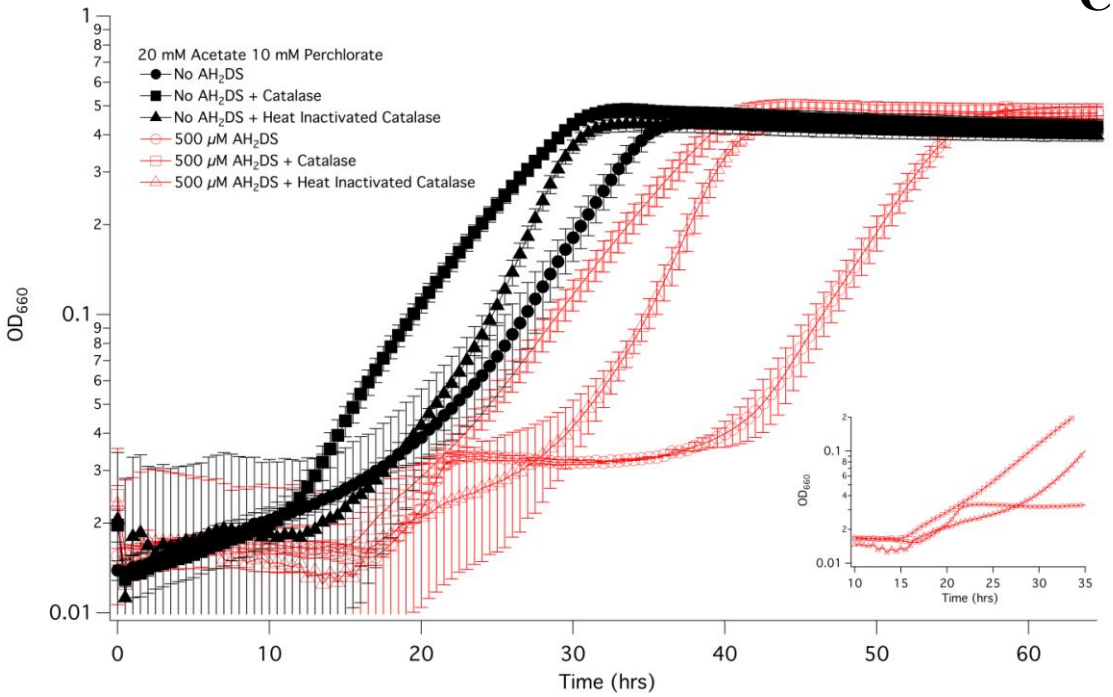


A



B

C



D

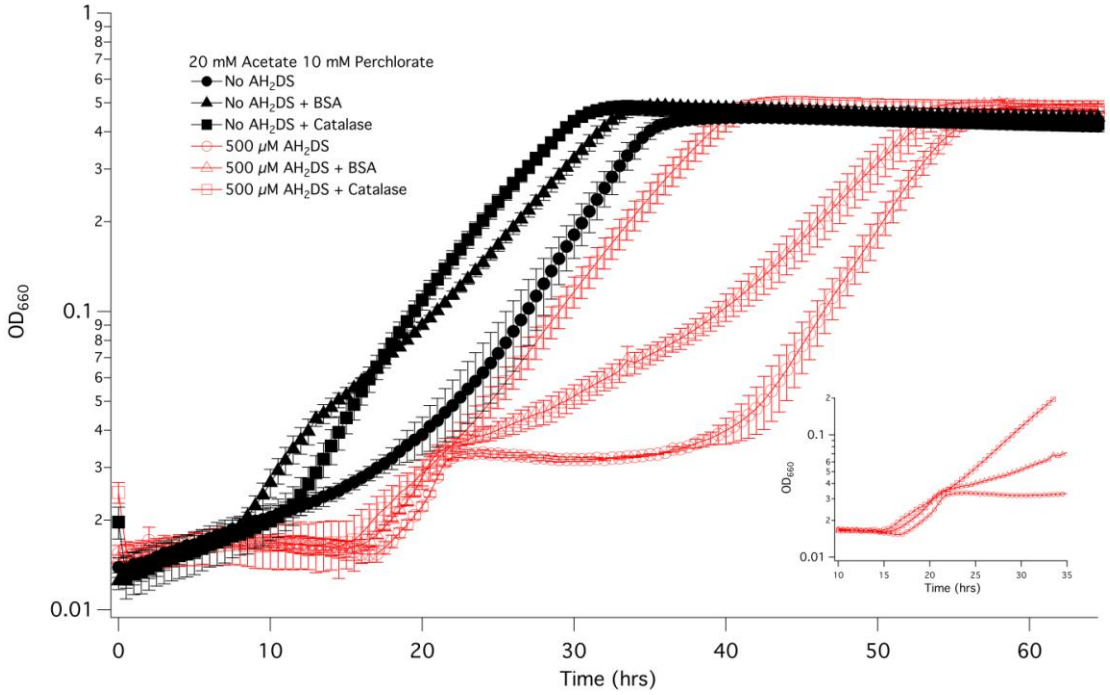
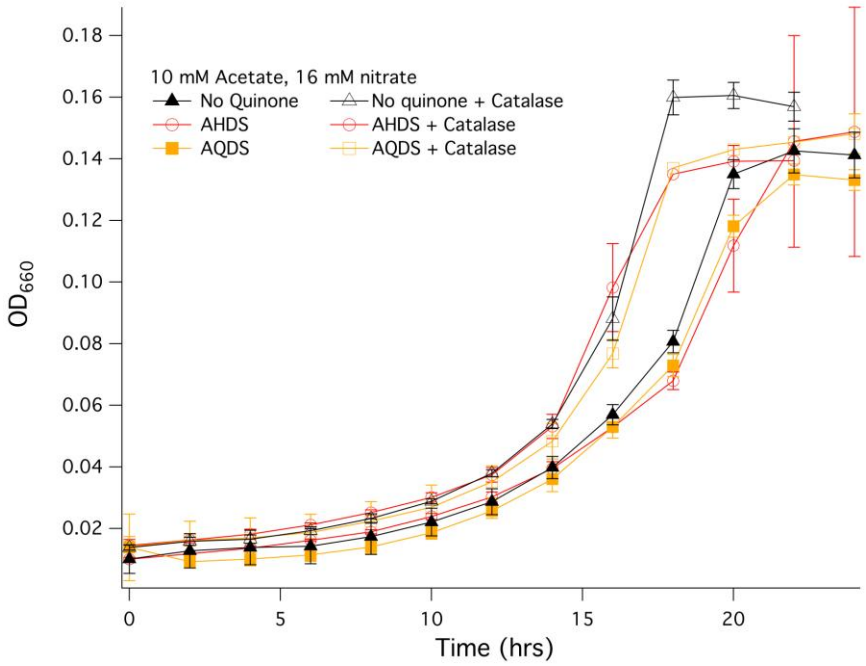
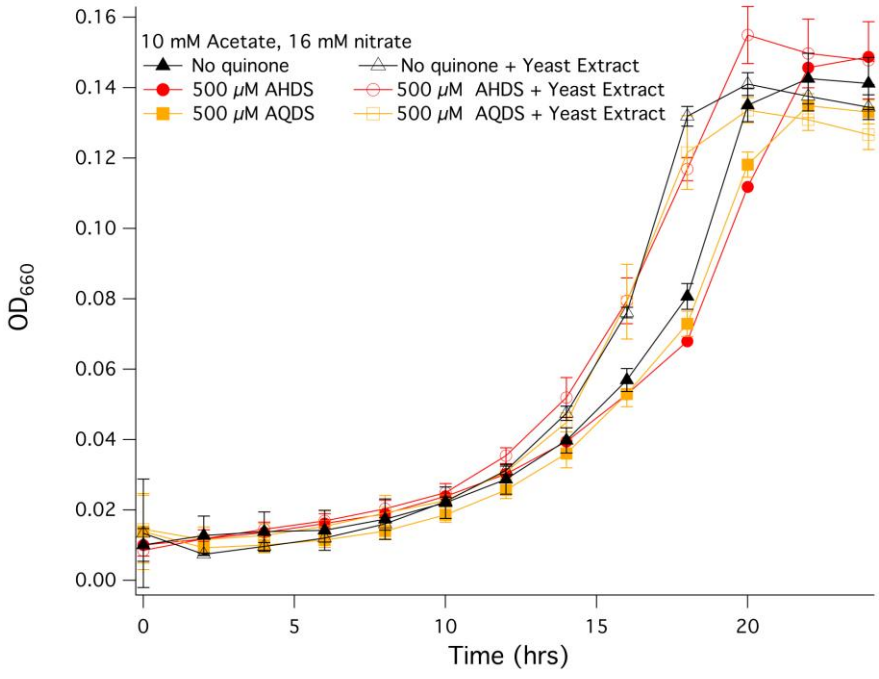


Figure S4.

Growth of *Azospira suillum* PS on 10 mM acetate and 10 mM nitrate in the presence of A) 1500 U ml^{-1} catalase and B) 0.1 mg ml^{-1} yeast extract. Yeast extract and catalase slightly decrease the growth lag of nitrate reducing cultures with 500 µM AHDS and 500 µM AQDS but this effect is missed unless cells are diluted to < 5 % inoculum so that a longer lag exists (10% inoculum curves are not shown, and the effect of catalase or yeast extract was negligible).



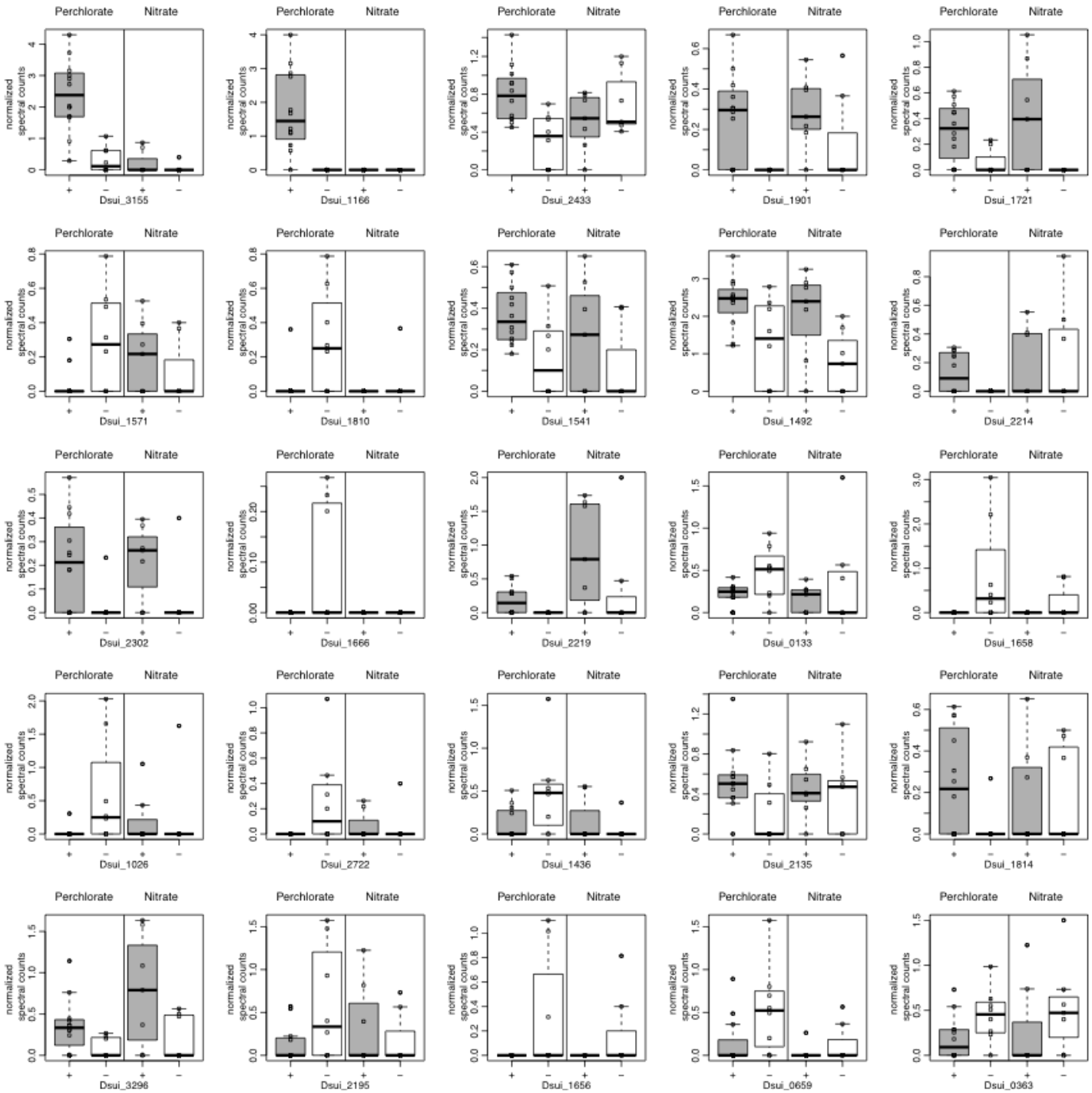
A



B

Figure S5.

Box plots of proteins with $p < 0.05$ from t-tests comparing perchlorate/acetate grown cells with (+) and without (-) the presence of 4 mM AH_2DS. Cells grown on nitrate and acetate, with (+) and without (-) 4 mM AH_2DS were run as a control, and are displayed alongside the perchlorate data. Trypsin shaved and lysed sample preparations have been pooled.



Electronic Supplementary Material (ESI) for Energy & Environmental Science