

Interactive comment on “Pyrite oxidization accelerates bacterial carbon sequestration in copper mine tailings Type of contribution” by Yang Li et al.

Anonymous Referee #2

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The manuscript explored the autotrophic microbes and the FeS₂ facilitation role in acidic mine tailings using stable isotope and molecular methods. The results showed that FeS₂ facilitated CO₂-fixing by microbes and increased the abundances of relevant autotrophs. The study is very interesting, which could provide new insights into the autotrophic roles in extreme environments. However, the article writing is awful in logic, result description and interpretation. Here are my concerns: 1 The introduction did not show some key points relevant to the research, such as possible CO₂-fixing pathways and autotrophs in acidic sulfur-enriched environments. The introduction was not well structured and really needs rewrite. 2 The method section failed to describe key details: 1) weather the samples were washed by acid prior to measuring isotope compositions?

2) no descriptions on chemical analysis in samples, i.e. solutes for Fe²⁺, Fe³⁺, SO₄²⁻.... 3) no citations for the primer sets, which were apparently designed in the study 4) no informations on PCR reactions 5) how did the authors determine the PCR efficiency? 6) how did the authors qualify gene abundance? standard curves? 7) no statistic software informations 8) how many replicates were for each treatment? 3 Fig1 symbols are very confusing, and no descriptions on the above and bottom columns. 4 No specific legends or descriptions on the two inserts in Fig. 3, and the color differences are not clear. 5 L252-261, 284-291, there are many super long sentences. A sentence usually contains maximum 22 words. 6 The CO₂-fixing capacity by autotrophs should be calculated. 7 L306-307, the statement is problematic: ¹²CO₂ is a control relative to ¹³CO₂, so the shift to heavy fractions should not be observed in ¹²CO₂. 8 L307-311, the statements are not correct: for the peak in ¹³CO₂ occurred in the density of 1.72 rather than 1.73 in both ¹²CO₂ and ¹³CO₂. 9 L311-314, the statements should go to discussion section. 10 Fig. 6, Cultured genus most related to OTU1, 2, 3 and 4 should be given for identifying purpose. 11 cbb is not a correct gene name, it should be cbbL or cbbM. 12 Is Fig. 5 for FeS₂ treatments or raw mine tailings? 13 L351-371, the paragraph should go to introduction section. 14 The discussion is far from the results, i.e. discuss why and how FeS₂ facilitates microbial CO₂-fixing and changes the whole bacterial community.

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Discussion paper

