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Interactive comment on “Role of extracellular polymeric substances (EPS) from *Pseudomonas putida* strain MnB1 in dissolution of natural rhodochrosite” by H. Wang and X. Pan

Anonymous Referee #1

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Role of extracellular polymeric substances (EPS) from *Pseudomonas putida* strain MnB1 in dissolution of natural rhodochrosite

H. Wang and X. Pan

The authors present an interesting laboratory study on the influence of EPS on rhodochrosite stability. The presented results clearly show that the presence of microbial EPS enhanced mineral dissolution, increasing the amount of Mn(II) required for microbial Mn(II) oxidation. Furthermore, Wang and Pan identified functional groups of the EPS primarily responsible for mineral dissolution. The study contributes to the, to date, fragmentary knowledge about microbial extracellular molecules, elucidating their

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potential impact on mineral stability. The presentation of the data is mostly adequate and appropriate literature citing is provided. The manuscript is reasonably short and does not require substantial shortening. The included figures are sufficient to illustrate the results. Unfortunately, in its current form the manuscript is not acceptable for publication. The general spelling and grammar requires substantial improvement. In the Material and Methods section several flaws are present (see specific comments) and it is not explained on what basis the dissolution rate of rhodochrosite was calculated. In addition it also not mentioned how the used δMnO_2 was synthesized. Furthermore, no information is provided about the statistical tests, which were performed.

Specific comments:

7274 l. 5 do not abbreviate strain name here. 7274 l. 7 rephrase, rhodochrosite is not oxidized, it is only dissolved. Once available, the Mn(II) ions are oxidized. 7274 l. 21 move reference directly behind ..reactivity and ...existence, if references are specific. 7274 l. 25 this sentence is very lost in this paragraph and thus confusing 7275 l. 5 add reference 7275 l. 10 has it been demonstrated or not? 7275 l. 26 change to ..oxides were analyzed by scanning. ... 7276 l. 5 do not abbreviate strain name here. 7276 l. 15 MilliQ is a trademark. Rather write "ultra-purified water" 7276 l. 16 add preparation of Mn oxides 7276 l. 21 did you powder the mineral for XRD-Analysis? Add information 7276 l. 21 inaccurate. Give a percentage values of rhodochrosite & quartz 7277 l. 5 how much suspension? 7277 l. 5 add space after ...cells 7277 l. 9 how many ml of aliquot per sampling? 7277 l. 9 do not give RPM values for centrifugations as. Use the g value for better comparison 7277 l. 12 how did you calculate the dissolution rate of Rhodo? Needs to be mentioned in the M&M section Somewhere you need to mention that you analyzed EPS prior and after reaction with Rhodo. How did you treat EPS after the reaction? Purification, etc..? 7277 l. 19 how long each time? 7278 l. 8 add method accuracies for Mn(II) and Mn oxides concentration analyses 7278 l. 18 what about the cleaning procedures of the minerals from the bacteria treatments? Did you clean them? Otherwise the EDS spectra are rather useless. 7278 l. 20 which

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software was used for XRD spectra analyses? 7279 I. 2 where do the SEM graphs show the presence of cells? Add this information to the figure caption. 7279 I. 2 how can you deduce a crystallographic information from an SEM picture, please clarify. 7279 I. 13 delete "For example" 7279 I. 22-23 this sentence is very confusing, please rephrase 7279 I. 26 rhodochrosite was not oxidized, but only dissolved 7280 I. 5 give pH values in the text 7280 I. 6 the pH did not decrease, you started at different pH values, clarify. 7280 I. 8 this sentence is confusing and your statement needs further explanation 7280 I. 17 why do you not show these data? I think it is important so see that EPS only enhanced dissolution, while the oxidation than has to be attributed to the bacteria. 7281 I. 10 do you mean "...reacting with..."? 7281 I. 14-16 speculate on the mechanism. How could these functional groups interact with the crystal? Complexation of Mn ions? Decrease of hydrophobicity at crystal surface, surface charge...? 7281 I. 17 "... dissolve Rhodochrosite and subsequently oxidize liberated Mn(II) ions to form Mn oxides." Again, you can not state that Rhodochrosite was oxidized, it was only dissolved. The resulting Mn(II) ions were oxidized.

Table 1 re-organize table so that you can delete the first row first row. Do you mean Rhodochrosite dosage? Fig. 1 this a spectrum of the mineral you used for your experiments, right? please add this information. Fig. 2 the EDS spectra of "biogenic Mn oxides" and the synthetic one seem to have very little in common. Shortly explain differences in figure caption. Fig. 3 flip a and b as this order is more logic as dissolution happens prior to precipitation. Fig. 4 write out "arbitrary units" in Y-axis label

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