minerals

Bio-Precipitation of Calcium and Magnesium Ions through Extracellular and Intracellular Process Induced by *Bacillus Licheniformis* SRB2

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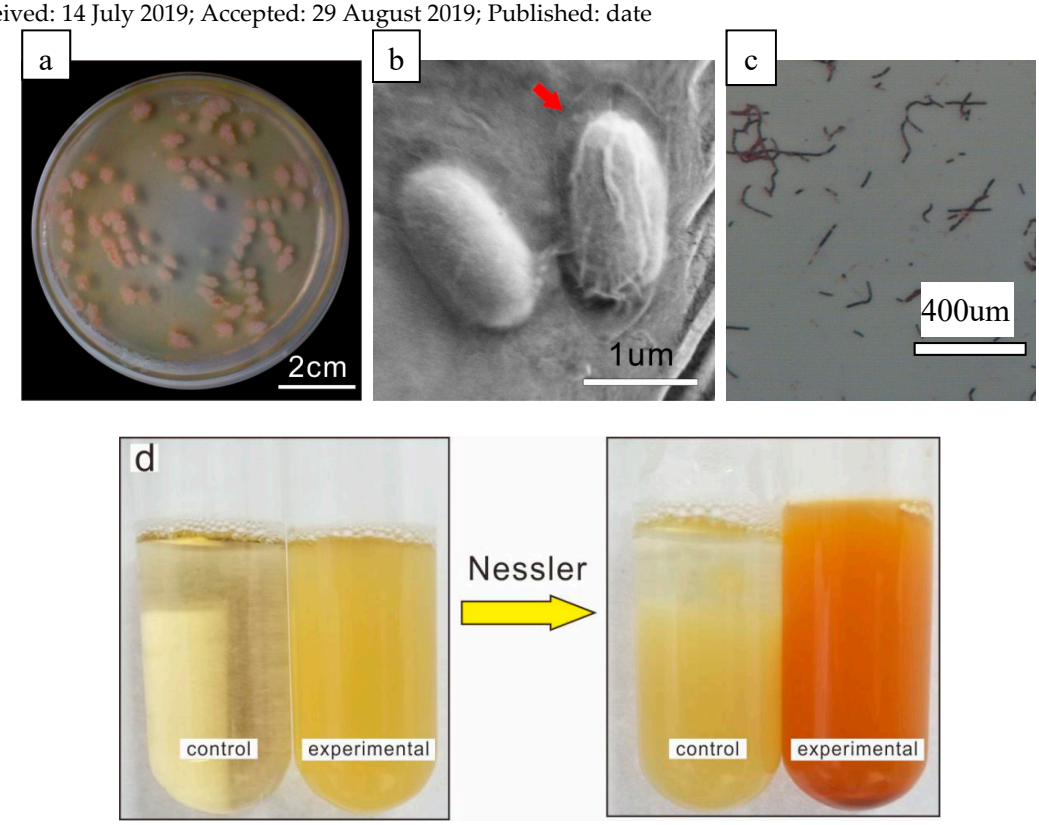


Figure S1 Physiological and biochemical characteristics of SRB2. (**a)** Colony morphology on plates; (**b)** Bacteria and extracellular polymers substances in SEM view; (**c)** Gram staining (purple, positive); (**d)** Ammonia test (positive).

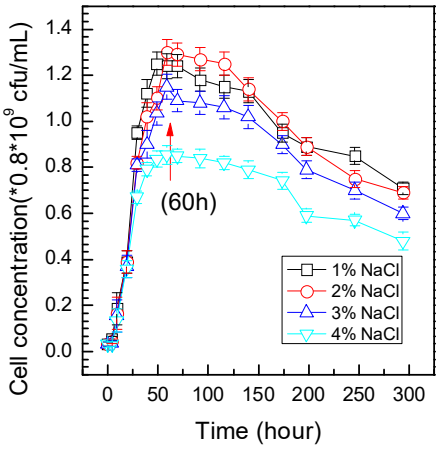


Figure S2. Growth curves of SRB2 in culture medium with various NaCl concentrations (1%, 2%, 3% and 4%).

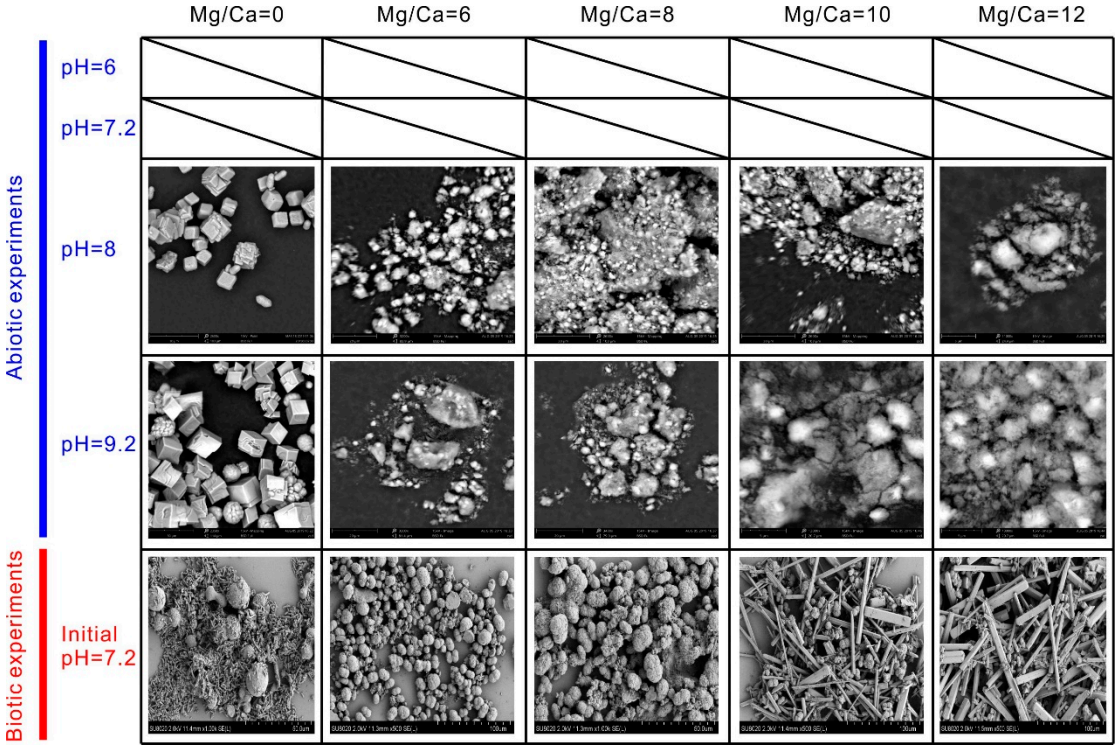


Figure S3. SEM results showing dramatic difference in morphologies of precipitates between the abiotic and biotic group.

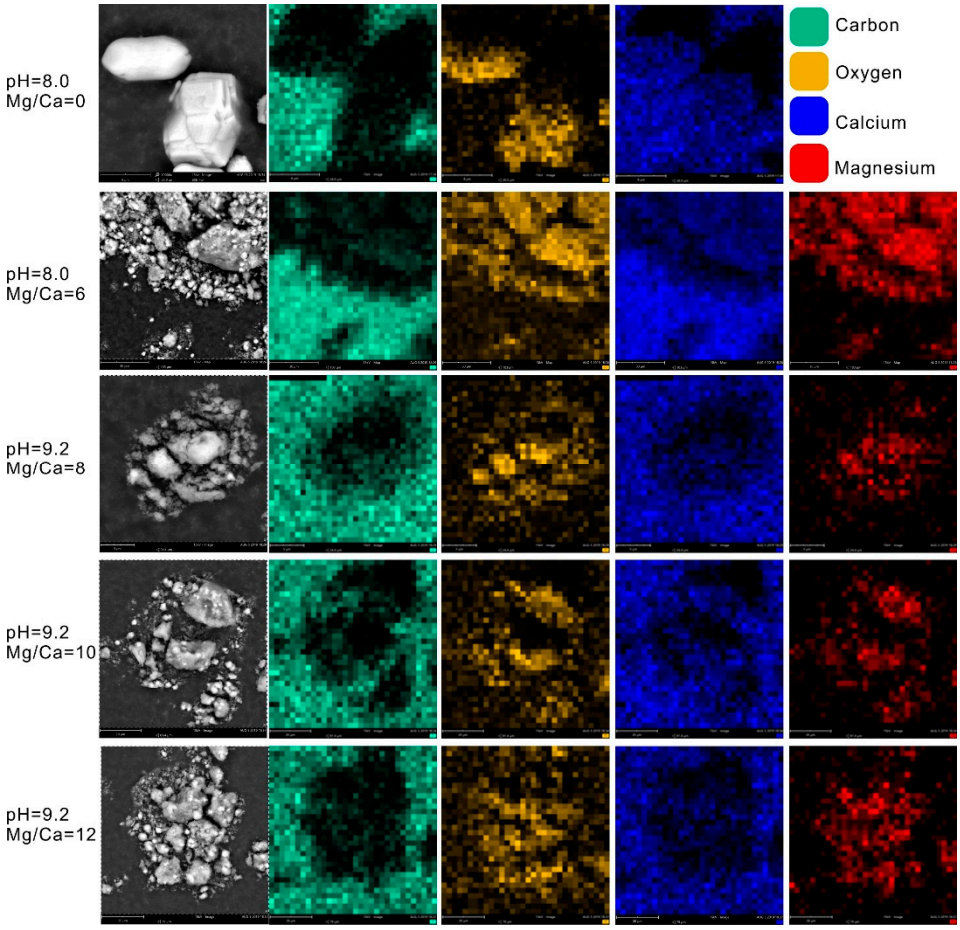
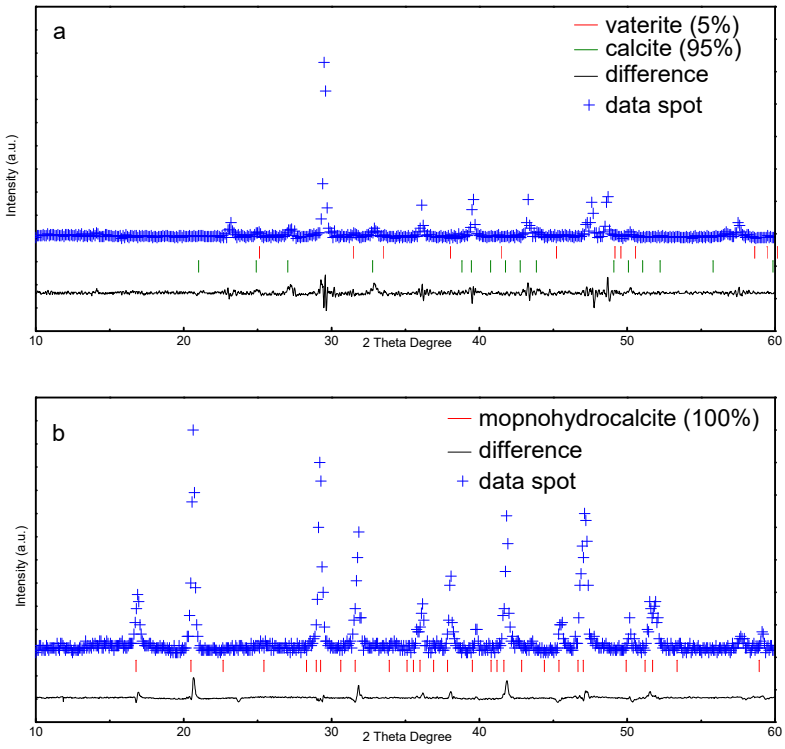


Figure S4. EDX-mapping of C, Ca, O and Mg in precipitates formed in abiotic control experiments with different Mg/Ca ratios and pH values.



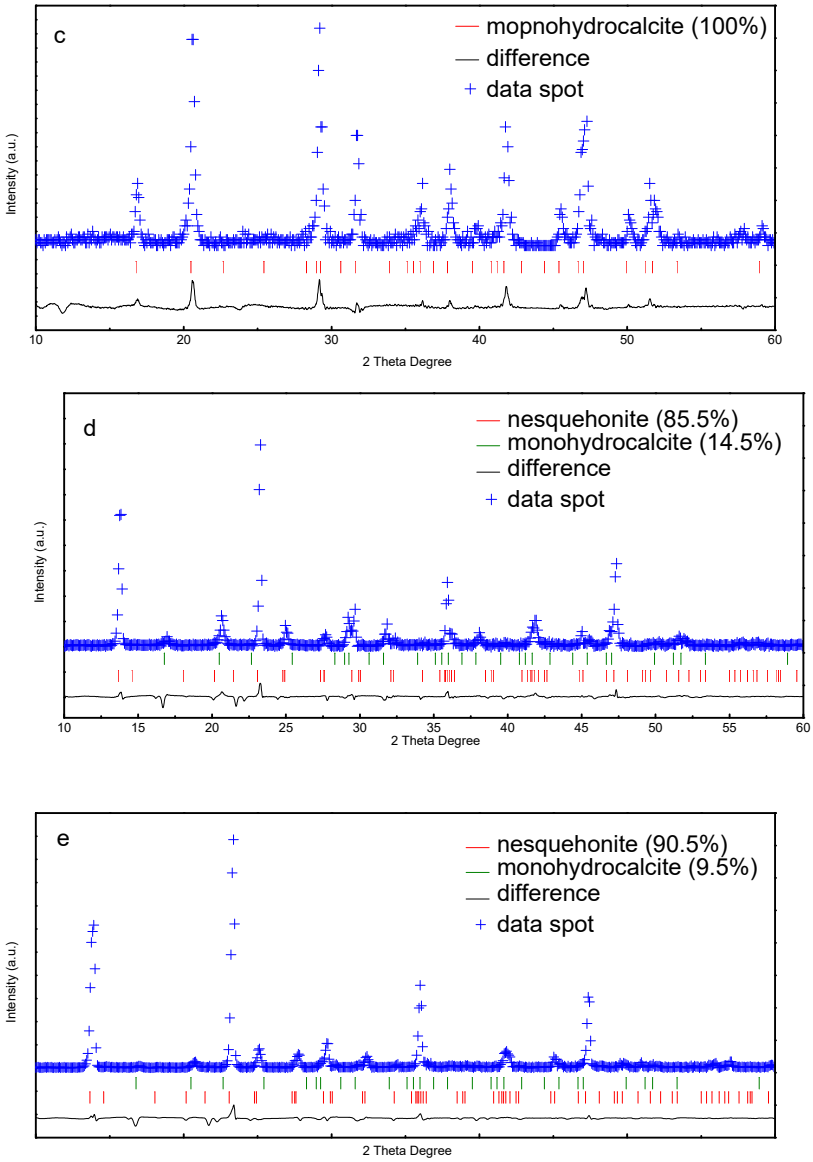


Figure S5. Rietveld refinement of XRD data in the experimental groups. (a) Mg/Ca = 0; (b) Mg/Ca = 6; (c) Mg/Ca = 8; (d) Mg/Ca = 10; (e) Mg/Ca = 12.

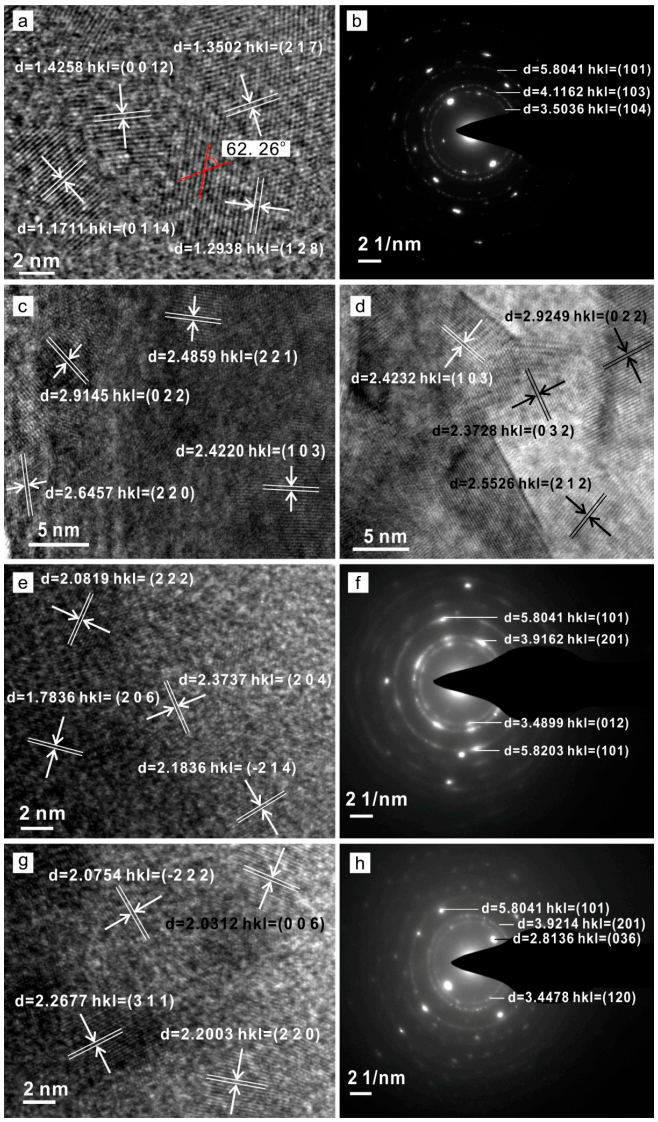


Figure S6. Images of HRTEM and SAED for minerals in the experimental groups for 12 days of cultivation. ((a) and (b): calcite and vaterite at Mg/Ca molar ratio 0; (c) and (d): monohydrocalcite at Mg/Ca molar ratios 6 and 8, respectively; e and f: nesquehonite and monohydrocalcite at Mg/Ca molar ratio 10, respectively; (g) and (h): nesquehonite and monohydrocalcite at Mg/Ca molar ratio 12, respectively. (a)–(e), and (g), HRTEM; (b), (f), and (h), SAED).

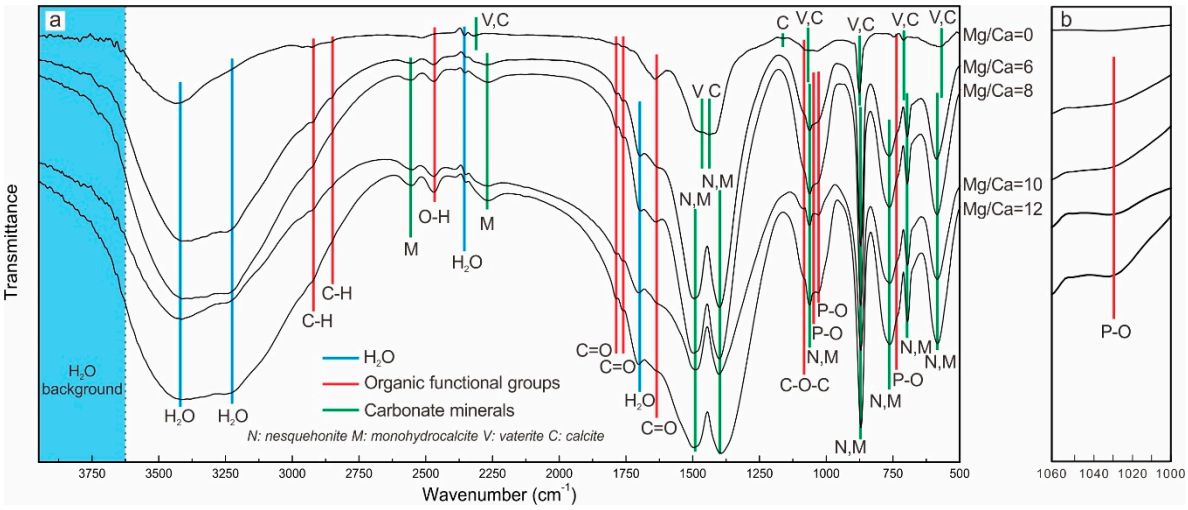


Figure S7. FTIR analyses of the characteristic organic functional groups in the minerals induced by *B. licheniformis* SRB2 strain at different Mg/Ca molar ratios.

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