Ecological impacts of CO_2 leakage from geologic CO_2 sequestration (GCS) sites

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EFRC: Nanoscale Control of Geologic CO_2

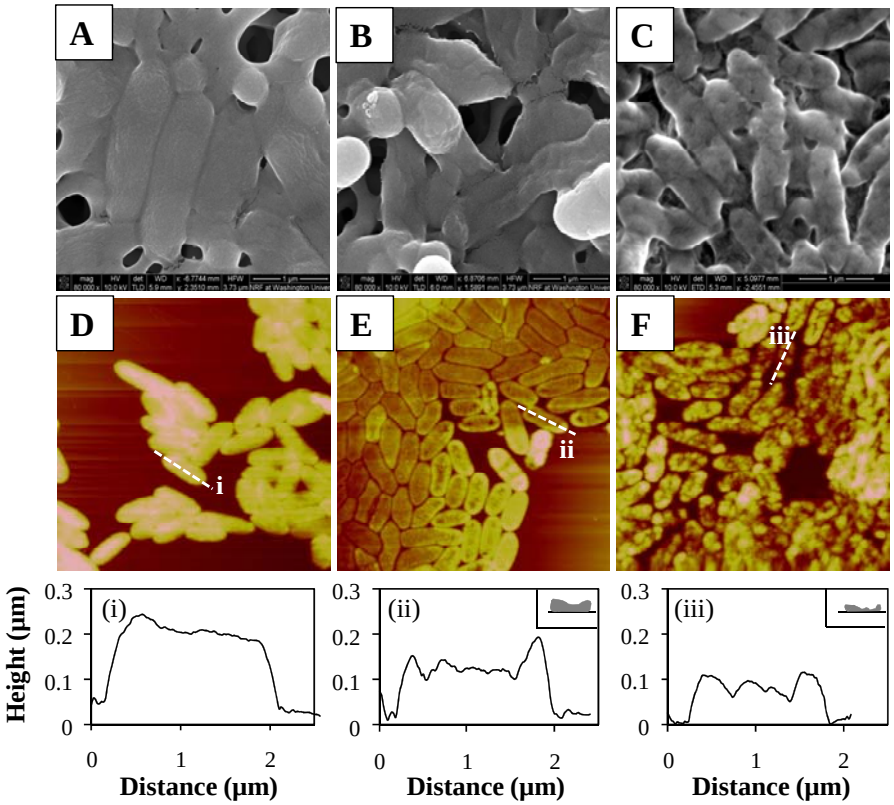

Figure 3. SEM and AFM images of *S. oneidensis* cells before and after CO_2 stress (100% CO_2, 150 psi). (A) and (D) Unstressed cells; (B) and (E) Cells after CO_2 stress for 30 min; (C) and (F) Cells after CO_2 stress for 5 hr. (A), (B), and (C) are SEM images and (D), (E), and (F) are AFM images. The AFM micrograph is shown in height mode (15 × 15 mm^2) at 298 K in air in the presence of aqueous media on quartz coupon surfaces. The height cross sections correspond to the white dotted lines in the AFM images

- While MR-1 could grow under high-pressure nitrogen gas, the addition of 1% CO_2 at total pressures of 15 or 150 psi significantly suppressed the growth of MR-1, compared to the N_2 control. When CO_2 partial pressures were over 15 psi, the growth of MR-1 stopped.

- The reduced bacterial viability was consistent with the pH decrease and cellular membrane damage under high pressure CO_2.

- After a relatively short exposure (25 min) to 150 psi CO_2, MR-1 could fully recover their growth within 24 hours after the stress was removed, and the reduction of MnO_2 by MR-1 was observed right after the stress was removed.

- MR-1 survived better if the cells were aggregated rather than suspended, or if pH buffering minerals, such as calcite, were present.

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