

Description of Additional Supplementary Files:

Supplementary Data 1: Stats of MAGs related to Met12 in this study.

Supplementary Data 2: Stats of archaeal genomes used in this study.

Supplementary Data 3: Summary of MS ortholog clusters.

Supplementary Data 4: Number of homolog families between microbes based on MS orthoMCL clusters.

Supplementary Data 5: Functional annotation and in situ gene expression levels of CDSs in Met12 MAG.

Supplementary Data 6: Close relatives of MmcX of Met12 that was highly expressed in the Cedars serpentinization setting.

Supplementary Data 7: Predicted 3D structure of MmcX of Met12.