SUPPLEMENTARY MATERIAL

Structure and function of the lanthanide-dependent methanol dehydrogenase XoxF from

the methanotroph *Methylomicrobium buryatense* 5GB1C
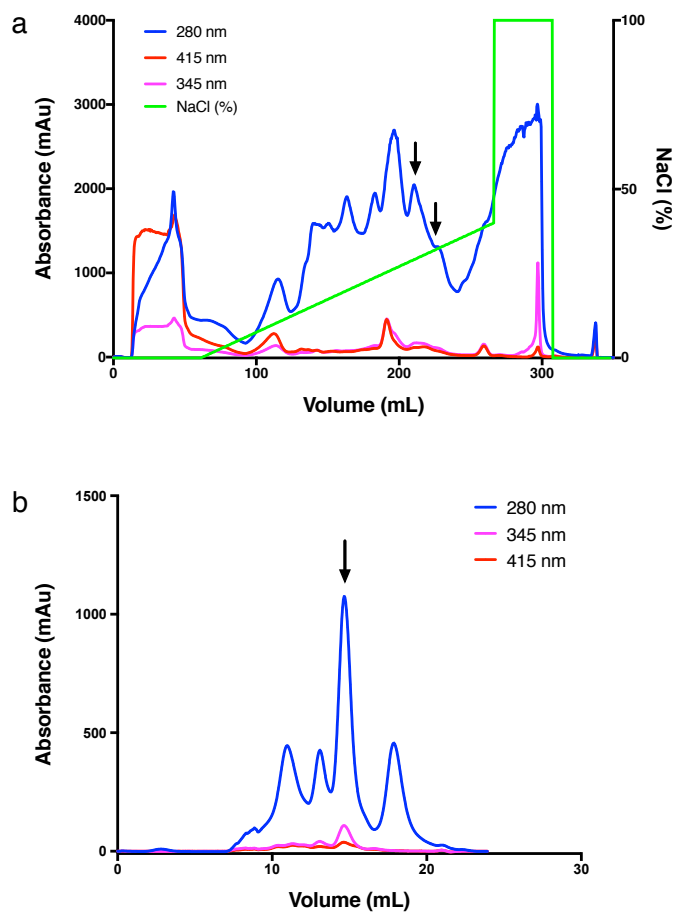
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PDB accession code: 6DAM

Fig. S1 Purification of 5G-XoxF. **a** Anion exchange chromatogram of *Mm. buryatense* 5GB1C soluble protein fraction (50 mM-400 mM NaCl gradient shown as a *green* slope) and **b** Superdex 200 size exclusion trace. 5G-XoxF is present in the peaks indicated by black arrows. The absorbance at three wavelengths, 280 nm, 345 nm, and 415 nm, is shown in *blue*, *pink*, and *red*, respectively.
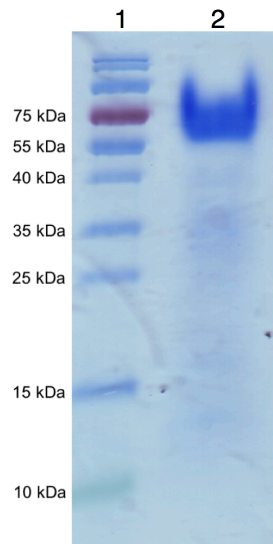
Fig. S2 SDS-PAGE of 5G-XoxF purified. Lane 1, molecular weight markers; lane 2, XoxF after the final purification step.
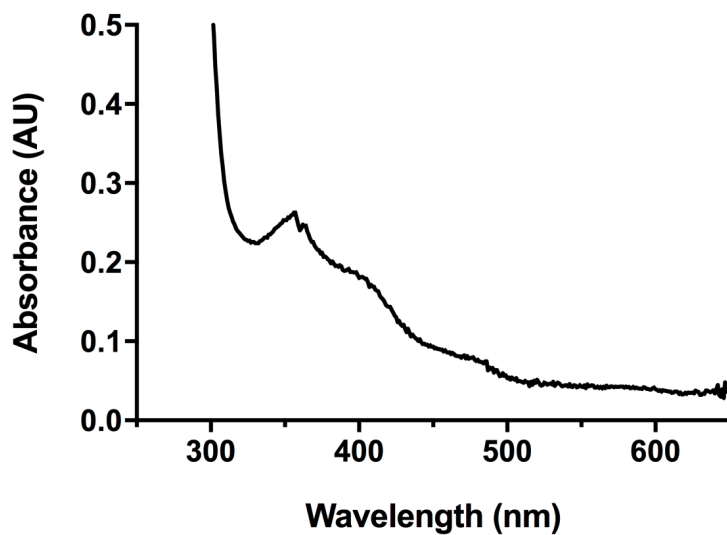
Fig. S3 5G-XoxF absorbance spectrum. Monitoring 5G-XoxF during column chromatography is based on the peak around 345 nm corresponding to the PQQ cofactor [50]. The peak around 415 nm is indicative of cytochrome contamination. A high 345 nm to 415 nm ratio indicates the presence of 5G-XoxF.
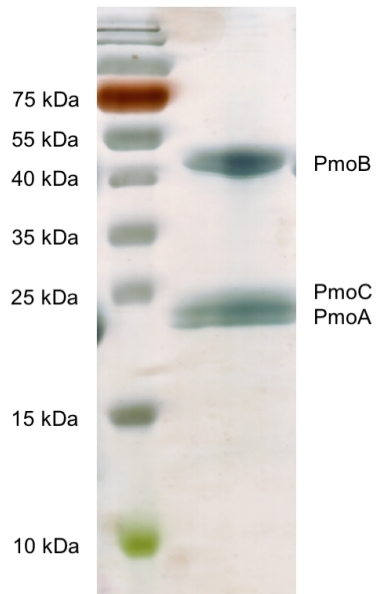
Fig. S4 SDS-PAGE of pMMO purified from *Mm. buryatense* 5G. The three subunits of 5G-pMMO are labeled; PmoA and PmoC run closely together on a 15% SDS-PAGE gel.
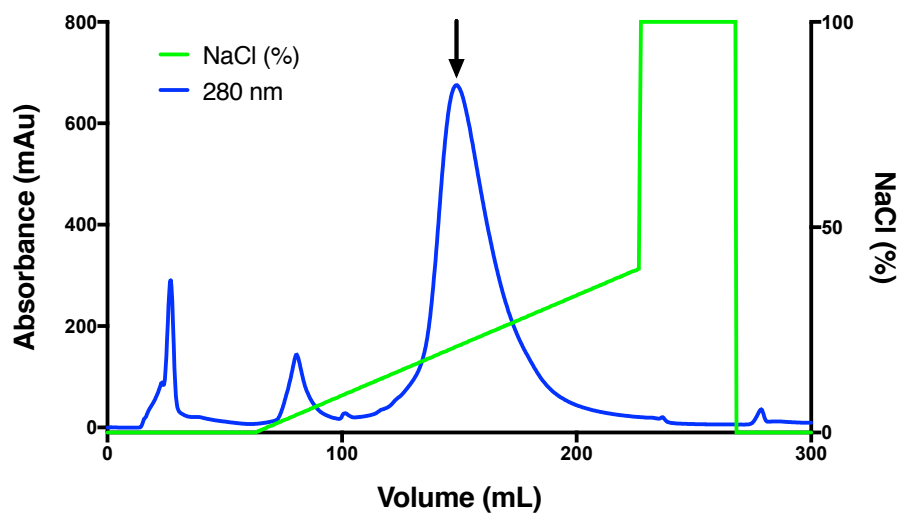
Fig. S5 Purification of 5G-pMMO. Anion exchange chromatogram of 5G-pMMO using Source 15Q. The absorbance at 280 nm is shown in *blue*. A 50-800 mM NaCl gradient is shown as a *green* slope (corresponding to 0-40%).
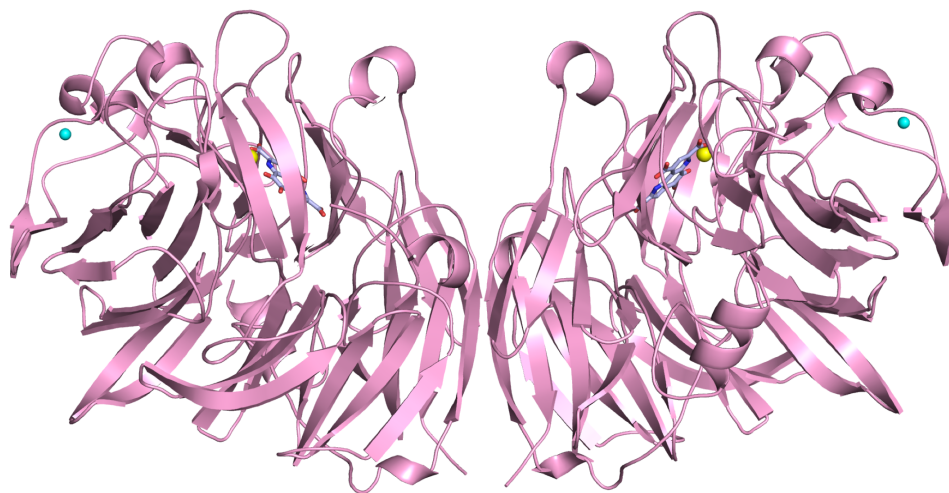
Fig. S6 5G-XoxF crystal packing. The 5G-XoxF monomer (*pink*) shown with its symmetry mate forms the standard dimer of other MDHs. The Na(III) ion is shown as a yellow sphere, the PQQ is shown as sticks, and a modeled sodium ion is shown as a cyan sphere.