

Supplementary Materials

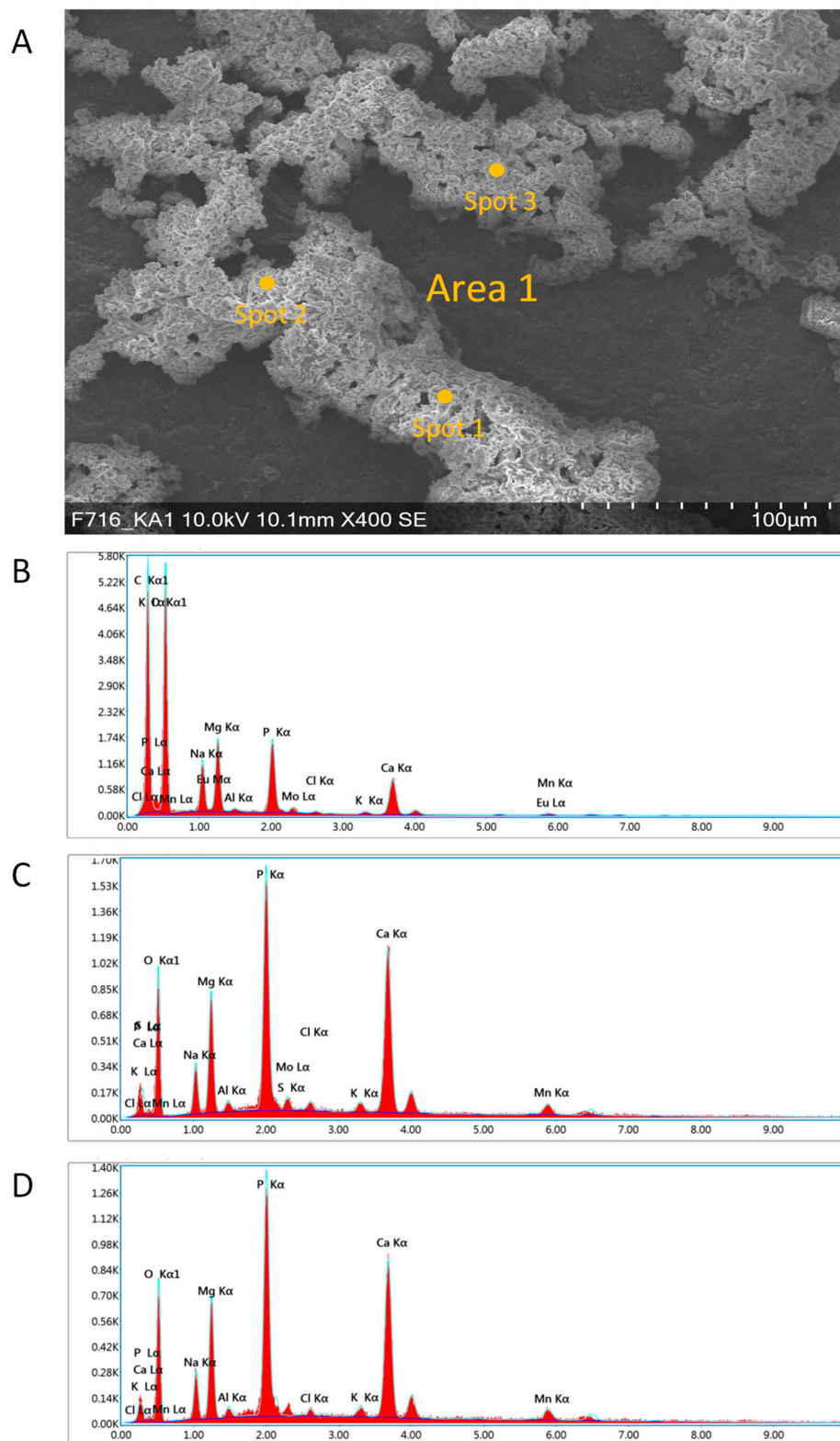


Figure S1. Element measurements at different spots of the electrode used during electromethanogenesis with *M. maripaludis* KA1. **(A)** SEM picture of electrode with deposits and distribution of the spots in area 1. **(B)** EDX analysis of spot 1, **(C)** EDX analysis of spot 2 and **(D)** EDX analysis of spot 3. The x-axis shows the energy in keV and the y-axis shows the total counts.

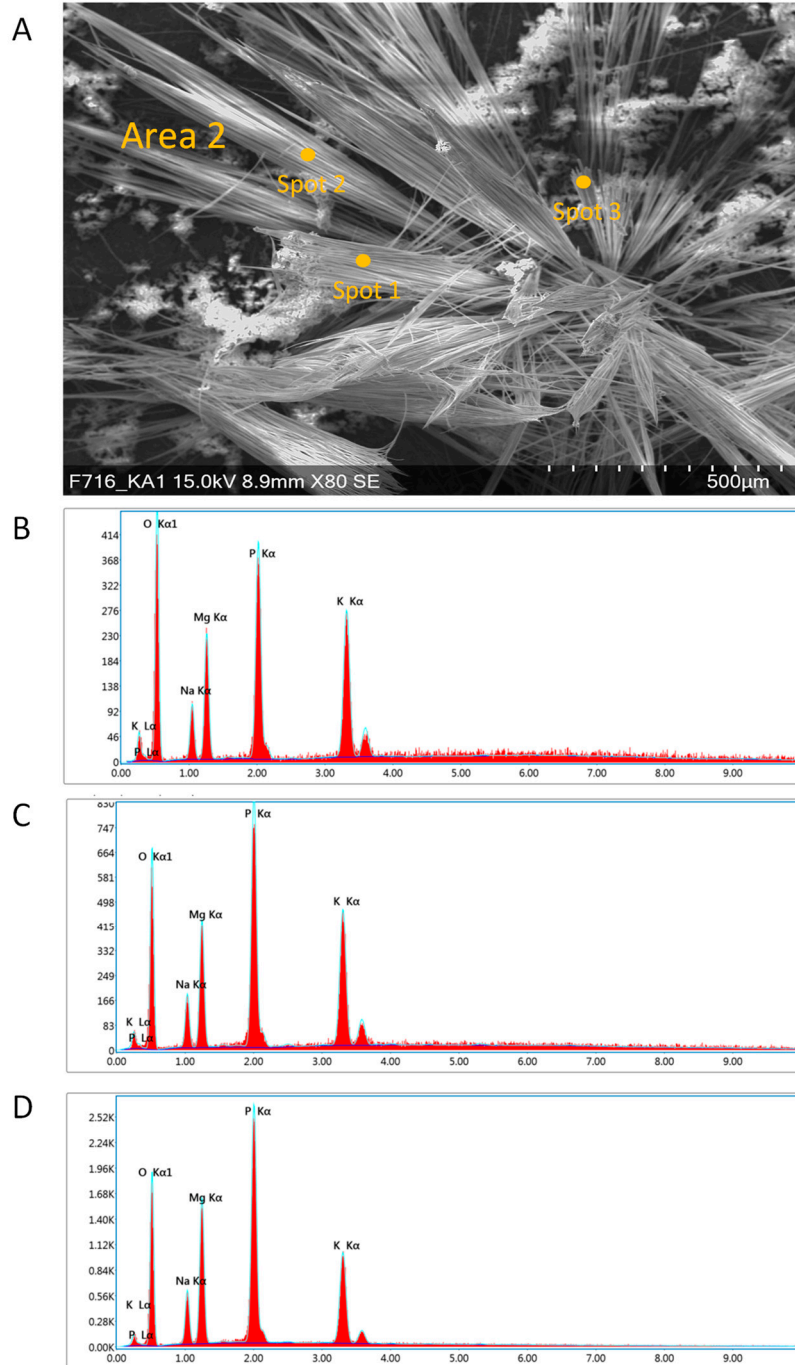


Figure S2. Element measurements at different spots of the electrode used during electromethanogenesis with *M. maripaludis* KA1. **(A)** SEM picture of electrode with deposits and distribution of the spots in area 2. **(B)** EDX analysis of spot 1, **(C)** EDX analysis of spot 2 and **(D)** EDX analysis of spot 3. The x-axis shows the energy in keV and the y-axis shows the total counts.

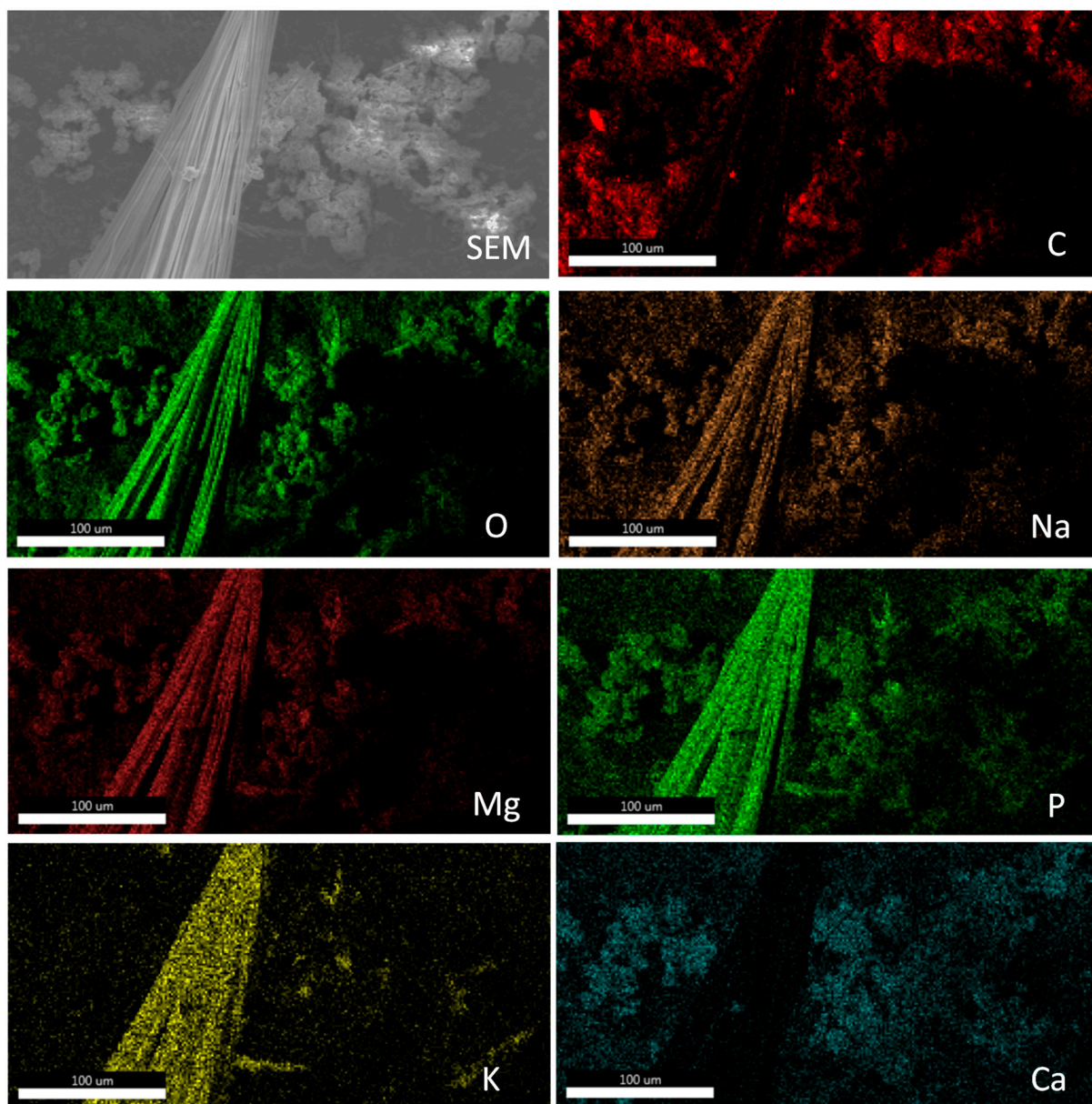


Figure S3. EDX mapping of an area with deposits of the electrode used during electromethanogenesis with *M. maripaludis* KA1. Different elements are shown in different colors.

Table S1. Additional genes in genome of *M. maripaludis* KA1 in comparison to strain S2.

Locus tag KA1	Gene/protein	
MMKA1_RS00465	4Fe-4S binding protein	Electron transport
MMKA1_RS00470	4Fe-4S binding protein	Electron transport
MMKA1_RS00475	4Fe-4S binding protein	Electron transport
MMKA1_RS00480	transcriptional regulator	
MMKA1_RS01060	hypothetical protein	
MMKA1_RS01065	hypothetical protein	
MMKA1_RS01290	hypothetical protein	
MMKA1_RS01295	hypothetical protein	
MMKA1_RS01300	DUF2341 domain-containing protein	
MMKA1_RS01305	hypothetical protein	
MMKA1_RS01310	DUF2341 domain-containing protein	
MMKA1_RS01700	hypothetical protein	
MMKA1_RS01875	UDP-glucose/GDP-mannose dehydrogenase family protein	
MMKA1_RS01920	TIGR04279 domain-containing protein	
MMKA1_RS01925	TIGR04279 domain-containing protein	
MMKA1_RS01930	hypothetical protein	
MMKA1_RS01935	polysaccharide biosynthesis protein	
MMKA1_RS01940	LegC family aminotransferase	
MMKA1_RS01945	Acetyltransferase	
MMKA1_RS01950	N-acetylneuraminate synthase	
MMKA1_RS01955	UDP-N-acetylglucosamine 2-epimerase (hydrolyzing)	
MMKA1_RS01960	acylneuraminate cytidyltransferase family protein	
MMKA1_RS01965	Acyltransferase	
MMKA1_RS01970	Flippase	
MMKA1_RS01975	DUF1616 domain-containing protein	
MMKA1_RS01980	hypothetical protein	
MMKA1_RS01985	hypothetical protein	
MMKA1_RS01990	hypothetical protein	
MMKA1_RS01995	Glycosyltransferase	
MMKA1_RS02000	glycosyltransferase family 9 protein	
MMKA1_RS02005	ADP-glyceromanno-heptose 6-epimerase	
MMKA1_RS02010	HAD family hydrolases	
MMKA1_RS02015	bifunctional heptose 7-phosphate kinase/heptose 1-phosphate adenylyltransferase	
MMKA1_RS02020	D-glycero-beta-D-manno-heptose 1-phosphate adenylyltransferase	
MMKA1_RS02025	D-sedoheptulose 7-phosphate isomerase	
MMKA1_RS02090	S-layer protein	
MMKA1_RS02305	tetratricopeptide repeat protein	
MMKA1_RS02310	hypothetical protein	
MMKA1_RS02345	hypothetical protein	
MMKA1_RS02500	hypothetical protein	
MMKA1_RS02505	hypothetical protein	
MMKA1_RS02510	hypothetical protein	
MMKA1_RS02515	hypothetical protein	
MMKA1_RS02520	hypothetical protein	

MMKA1_RS02525	tyrosine-type recombinase/integrase	
MMKA1_RS02530	hypothetical protein	
MMKA1_RS02535	hypothetical protein	
MMKA1_RS02540	hypothetical protein	
MMKA1_RS02545	hypothetical protein	
MMKA1_RS02550	hypothetical protein	
MMKA1_RS02555	helix-turn-helix domain-containing protein	
MMKA1_RS02560	hypothetical protein	
MMKA1_RS02565	tetratricopeptide repeat protein	
MMKA1_RS02570	hypothetical protein	
MMKA1_RS02575	hypothetical protein	
MMKA1_RS02580	hypothetical protein	
MMKA1_RS02585	recombinase family protein	
MMKA1_RS02590	hypothetical protein	
MMKA1_RS02595	hypothetical protein	
MMKA1_RS02600	ATP-binding protein	
MMKA1_RS02605	hypothetical protein	
MMKA1_RS02615	hypothetical protein	
MMKA1_RS02620	hypothetical protein	
MMKA1_RS02625	hypothetical protein	
MMKA1_RS02630	hypothetical protein	
MMKA1_RS02635	hypothetical protein	
MMKA1_RS02640	hypothetical protein	
MMKA1_RS02645	hypothetical protein	
MMKA1_RS02650	hypothetical protein	
MMKA1_RS02655	ABC transporter substrate-binding protein	
MMKA1_RS02660	ABC transporter ATP-binding protein	
MMKA1_RS02665	hypothetical protein	
MMKA1_RS02670	VWA domain-containing protein	
MMKA1_RS02675	AAA domain-containing protein	
MMKA1_RS02680	cobaltochelate subunit CobN	
MMKA1_RS02685	hypothetical protein	
MMKA1_RS02690	hypothetical protein	
MMKA1_RS02695	hypothetical protein	
MMKA1_RS02700	PKD domain-containing protein	
MMKA1_RS02705	ABC transporter substrate-binding protein	
MMKA1_RS02710	iron ABC transporter permease	Diffusion of molecules
MMKA1_RS02715	iron ABC transporter permease	Diffusion of molecules
MMKA1_RS02720	TIM barrel protein	
MMKA1_RS02725	bifunctional adenosylcobinamide kinase/adenosylcobinamide-phosphate guanylyltransferase	
MMKA1_RS02730	MarR family transcriptional regulator	
MMKA1_RS02735	hypothetical protein	
MMKA1_RS02740	FRG domain-containing protein	
MMKA1_RS02745	hypothetical protein	
MMKA1_RS02750	hypothetical protein	
MMKA1_RS02820	hypothetical protein	
MMKA1_RS03130	hypothetical protein	
MMKA1_RS03330	class III signal peptide-containing protein	
MMKA1_RS03730	hypothetical protein	
MMKA1_RS04040	tRNA-Ser	

MMKA1 RS04045	site-specific integrase	
MMKA1 RS04050	hypothetical protein	
MMKA1 RS04055	hypothetical protein	
MMKA1 RS04060	site-specific integrase	
MMKA1 RS04065	DUF2540 domain-containing protein	
MMKA1 RS04070	hypothetical protein	
MMKA1 RS04075	nucleotidyltransferase family protein	
MMKA1 RS04080	nucleotidyltransferase family protein	
MMKA1 RS04085	Fic family protein	
MMKA1 RS04090	Nucleotidyltransferase	
MMKA1 RS04095	hypothetical protein	
MMKA1 RS04100	GIY-YIG nuclease family protein	
MMKA1 RS04105	winged helix DNA-binding protein	
MMKA1 RS04110	ATP-dependent DNA helicase	
MMKA1 RS04115	DEAD/DEAH box helicase	
MMKA1 RS04120	hypothetical protein	
MMKA1 RS04125	M48 family metalloproteinase	
MMKA1 RS04130	type I restriction endonuclease subunit R	
MMKA1 RS04135	hypothetical protein	
MMKA1 RS04140	hypothetical protein	
MMKA1 RS04145	type I restriction-modification system subunit M	
MMKA1 RS04150	restriction endonuclease subunit S	
MMKA1 RS04155	EVE domain-containing protein	
MMKA1 RS04160	hypothetical protein	
MMKA1 RS04165	hypothetical protein	
MMKA1 RS04170	DUF2975 domain-containing protein	
MMKA1 RS04175	hypothetical protein	
MMKA1 RS04180	DUF262 domain-containing protein	
MMKA1 RS04185	hypothetical protein	
MMKA1 RS04190	hypothetical protein	
MMKA1 RS04195	hypothetical protein	
MMKA1_RS04200	type II toxin-antitoxin system mRNA interferase toxin, RelE/StbE family	
MMKA1 RS04205	DUF3883 domain-containing protein	
MMKA1 RS04210	hypothetical protein	
MMKA1 RS04215	BREX system P-loop protein BrxC	
MMKA1 RS04220	DUF1819 family protein	
MMKA1 RS04225	CRISPR locus-related DNA-binding protein	
MMKA1 RS04230	ATP-dependent helicase	
MMKA1 RS04235	thermonuclease family protein	
MMKA1 RS04240	hypothetical protein	
MMKA1 RS04245	YjzC family protein	
MMKA1 RS04250	hypothetical protein	
MMKA1 RS04255	hypothetical protein	
MMKA1 RS04260	DUF4263 domain-containing protein	
MMKA1 RS04265	DEAD/DEAH box helicase	
MMKA1 RS04270	3'-5' exonuclease	
MMKA1 RS04275	hypothetical protein	
MMKA1 RS04280	recombinase family protein	
MMKA1 RS04285	hypothetical protein	
MMKA1 RS04290	DUF2683 family protein	
MMKA1 RS04295	hypothetical protein	
MMKA1 RS04300	AAA family ATPase	
MMKA1 RS04305	flavodoxin family protein	

MMKA1_RS04310	calcium/sodium antiporter	
MMKA1_RS04315	hypothetical protein	
MMKA1_RS04320	KamA family radical SAM protein	
MMKA1_RS04325	GNAT family N-acetyltransferase	
MMKA1_RS04330	site-specific integrase	
MMKA1_RS04335	hypothetical protein	
MMKA1_RS04340	ABC transporter permease	
MMKA1_RS04345	DUF4013 domain-containing protein	
MMKA1_RS04350	WYL domain-containing protein	
MMKA1_RS04355	hypothetical protein	
MMKA1_RS04360	trypsin-like peptidase domain-containing protein	
MMKA1_RS04365	hypothetical protein	
MMKA1_RS04370	hypothetical protein	
MMKA1_RS04435	flavodoxin family protein	
MMKA1_RS04500	radical SAM protein	
MMKA1_RS04505	hypothetical protein	
MMKA1_RS04510	hypothetical protein	
MMKA1_RS04515	RHS repeat-associated core domain-containing protein	
MMKA1_RS04520	hypothetical protein	
MMKA1_RS04525	RHS repeat-associated core domain-containing protein	
MMKA1_RS04530	hypothetical protein	
MMKA1_RS04535	hypothetical protein	
MMKA1_RS04540	hypothetical protein	
MMKA1_RS04545	hypothetical protein	
MMKA1_RS04550	hypothetical protein	
MMKA1_RS04555	hypothetical protein	
MMKA1_RS04560	hypothetical protein	
MMKA1_RS04565	RHS repeat-associated core domain-containing protein	
MMKA1_RS04570	hypothetical protein	
MMKA1_RS04575	hypothetical protein	
MMKA1_RS04580	hypothetical protein	
MMKA1_RS04630	formylmethanofuran dehydrogenase subunit B	
MMKA1_RS04730	N-6 DNA methylase	
MMKA1_RS04735	DUF2283 domain-containing protein	
MMKA1_RS04740	hypothetical protein	
MMKA1_RS04745	Integrase	
MMKA1_RS04875	hypothetical protein	
MMKA1_RS04880	hypothetical protein	
MMKA1_RS04885	hypothetical protein	
MMKA1_RS04920	S-layer protein	
MMKA1_RS05315	hypothetical protein	
MMKA1_RS05320	tyrosine-type recombinase/integrase	
MMKA1_RS05325	helix-turn-helix transcriptional regulator	
MMKA1_RS05330	hypothetical protein	
MMKA1_RS05335	hypothetical protein	
MMKA1_RS05340	hypothetical protein	
MMKA1_RS05345	CRISPR-associated endonuclease Cas6	
MMKA1_RS05350	CRISPR-associated helicase Cas3'	
MMKA1_RS05355	type I-B CRISPR-associated protein Cas5	
MMKA1_RS05360	type I-B CRISPR-associated protein Cas7/Csh2	
MMKA1_RS05365	TIGR02556 family CRISPR-associated protein	

MMKA1_RS05370	CRISPR-associated endonuclease Cas1	
MMKA1_RS05375	CRISPR-associated endonuclease Cas2	
MMKA1_RS05380	CRISPR-associated protein Cas4	
MMKA1_RS05450	formylmethanofuran dehydrogenase	
MMKA1_RS05455	FprA family A-type flavoprotein	
MMKA1_RS05460	YgiQ family radical SAM protein	
MMKA1_RS05465	phosphoenolpyruvate carboxylase	
MMKA1_RS05470	hydroxyethylthiazole kinase	
MMKA1_RS05475	thiamine phosphate synthase	
MMKA1_RS05480	hypothetical protein	
MMKA1_RS05485	formylmethanofuran dehydrogenase subunit A	
MMKA1_RS05490	formylmethanofuran dehydrogenase subunit C	
MMKA1_RS05495	4Fe-4S binding protein	Electron transport
MMKA1_RS05500	4Fe-4S dicluster domain-containing protein	Electron transport
MMKA1_RS05505	hypothetical protein	
MMKA1_RS05510	ATP-binding cassette domain-containing protein	
MMKA1_RS05515	hypothetical protein	
MMKA1_RS05520	formylmethanofuran dehydrogenase subunit B	
MMKA1_RS05525	formylmethanofuran dehydrogenase subunit B	
MMKA1_RS05530	hypothetical protein	
MMKA1_RS05535	CO dehydrogenase/acetyl-CoA synthase complex subunit epsilon	
MMKA1_RS05540	CO dehydrogenase/acetyl-CoA synthase complex subunit epsilon	
MMKA1_RS05545	threonylcarbamoyl-AMP synthase	
MMKA1_RS05550	4Fe-4S dicluster domain-containing protein	Electron transport
MMKA1_RS05555	hypothetical protein	
MMKA1_RS05560	2-oxoglutarate ferredoxin oxidoreductase subunit gamma	Ferredoxin-containing protein
MMKA1_RS05565	2-oxoacid:ferredoxin oxidoreductase subunit beta	Ferredoxin-containing protein
MMKA1_RS05570	2-oxoacid:acceptor oxidoreductase subunit alpha	Ferredoxin-containing protein
MMKA1_RS05575	ferredoxin family protein	Ferredoxin-containing protein
MMKA1_RS05580	4Fe-4S binding protein	Electron transport
MMKA1_RS05585	4Fe-4S binding protein	Electron transport
MMKA1_RS05590	5-(carboxyamino)imidazole ribonucleotide mutase	
MMKA1_RS05595	MTH1187 family thiamine-binding protein	
MMKA1_RS05600	carbonic anhydrase	
MMKA1_RS05605	phosphoribosylaminoimidazolesuccinocarboxamide synthase	
MMKA1_RS05610	chemotaxis protein	
MMKA1_RS05615	carbamoyl-phosphate synthase large subunit	
MMKA1_RS05620	glutamine-hydrolyzing carbamoyl-phosphate synthase small subunit	
MMKA1_RS05625	pyruvate synthase subunit beta	
MMKA1_RS05630	2-ketoisovalerate ferredoxin oxidoreductase subunit alpha (=porA)	Ferredoxin-containing protein
MMKA1_RS05635	4Fe-4S binding protein	Electron transport
MMKA1_RS05640	pyruvate ferredoxin oxidoreductase subunit gamma	
MMKA1_RS05645	Permease	
MMKA1_RS05650	4Fe-4S binding protein	Electron transport

MMKA1_RS05655	molybdate ABC transporter substrate-binding protein	
MMKA1_RS05825	hypothetical protein	
MMKA1_RS05830	hypothetical protein	
MMKA1_RS05835	hypothetical protein	
MMKA1_RS06040	N-6 DNA methylase	
MMKA1_RS06045	restriction endonuclease	
MMKA1_RS06145	hypothetical protein	
MMKA1_RS06150	hypothetical protein	
MMKA1_RS06155	endonuclease III	
MMKA1_RS06160	hypothetical protein	
MMKA1_RS06165	hypothetical protein	
MMKA1_RS06170	hypothetical protein	
MMKA1_RS06175	hypothetical protein	MIC island
MMKA1_RS06180	hypothetical protein	MIC island
MMKA1_RS06185	hydrogenase maturation protease	MIC island
MMKA1_RS06190	twin-arginine translocase subunit TatC	MIC island
MMKA1_RS06195	twin-arginine translocase TatA/TatE family subunit	MIC island
MMKA1_RS06200	carbonic anhydrase	MIC island
MMKA1_RS06205	PAS domain S-box protein	
MMKA1_RS06325	mannose-1-phosphate guanylyltransferase/ mannose-6-phosphate isomerase	
MMKA1_RS06330	glycosyltransferase family 4 protein	
MMKA1_RS06335	glycosyltransferase family 4 protein	
MMKA1_RS06340	glycosyltransferase family 2 protein	
MMKA1_RS06545	ABC transporter substrate-binding protein	
MMKA1_RS06550	ABC transporter permease	
MMKA1_RS06555	ABC transporter permease	
MMKA1_RS06560	ABC transporter ATP-binding protein	
MMKA1_RS06565	ATP-binding cassette domain-containing protein	
MMKA1_RS07110	cobalt-precorrin-7 (C(5))-methyltransferase	
MMKA1_RS07115	hypothetical protein	
MMKA1_RS07120	hypothetical protein	
MMKA1_RS07125	hypothetical protein	
MMKA1_RS07130	HAD family hydrolases	
MMKA1_RS07135	phosphoadenosine phosphosulfate reductase family protein	
MMKA1_RS07140	formate dehydrogenase accessory sulfurtransferase FdhD	
MMKA1_RS07145	HesA/MoeB/ThiF family protein	
MMKA1_RS07150	molybdenum cofactor biosynthesis protein MoaE	
MMKA1_RS07155	UPF0280 family protein	
MMKA1_RS07160	hypothetical protein	
MMKA1_RS07165	biotin synthase BioB	
MMKA1_RS07170	ATP-dependent sacrificial sulfur transferase LarE	
MMKA1_RS07175	O-phospho-L-seryl-tRNA:Cys-tRNA synthase	
MMKA1_RS07180	hypothetical protein	
MMKA1_RS07185	quinolinate synthase NadA	
MMKA1_RS07190	hypothetical protein	
MMKA1_RS07195	cobalt-precorrin-7 (C(5))-methyltransferase	
MMKA1_RS07200	hypothetical protein	
MMKA1_RS07205	hypothetical protein	
MMKA1_RS07210	hypothetical protein	
MMKA1_RS07215	HAD family hydrolases	

MMKA1_RS07220	phosphoadenosine phosphosulfate reductase familyprotein	
MMKA1_RS07225	formate dehydrogenase accessory sulfurtransferase FdhD	
MMKA1_RS07230	HesA/MoeB/ThiF family protein	
MMKA1_RS07235	molybdenum cofactor biosynthesis protein MoaE	
MMKA1_RS07240	UPF0280 family protein	
MMKA1_RS07245	hypothetical protein	
MMKA1_RS07250	biotin synthase BioB	
MMKA1_RS07255	ATP-dependent sacrificial sulfur transferase LarE	
MMKA1_RS07260	O-phospho-L-seryl-tRNA:Cys-tRNA synthase	
MMKA1_RS07265	hypothetical protein	
MMKA1_RS07270	quinolinate synthase NadA	
MMKA1_RS07275	hypothetical protein	
MMKA1_RS07280	cobalt-precorrin-7 (C(5))-methyltransferase	
MMKA1_RS07285	hypothetical protein	
MMKA1_RS07290	hypothetical protein	
MMKA1_RS07295	hypothetical protein	
MMKA1_RS07300	HAD family hydrolases	
MMKA1_RS07305	phosphoadenosine phosphosulfate reductase familyprotein	
MMKA1_RS07310	formate dehydrogenase accessory sulfurtransferase FdhD	
MMKA1_RS07315	HesA/MoeB/ThiF family protein	
MMKA1_RS07320	molybdenum cofactor biosynthesis protein MoaE	
MMKA1_RS07325	UPF0280 family protein	
MMKA1_RS07330	hypothetical protein	
MMKA1_RS07335	biotin synthase BioB	
MMKA1_RS07340	ATP-dependent sacrificial sulfur transferase LarE	
MMKA1_RS07345	O-phospho-L-seryl-tRNA:Cys-tRNA synthase	
MMKA1_RS07350	hypothetical protein	
MMKA1_RS07355	quinolinate synthase NadA	
MMKA1_RS07360	hypothetical protein	
MMKA1_RS08615	S-layer protein	
MMKA1_RS08705	amino acid ABC transporter substrate-binding protein	
MMKA1_RS08710	hypothetical protein	
MMKA1_RS08745	hypothetical protein	
MMKA1_RS08750	DUF2226 domain-containing protein	
MMKA1_RS08810	hypothetical protein	
MMKA1_RS09655	class III signal peptide-containing protein	

