Supplementary material

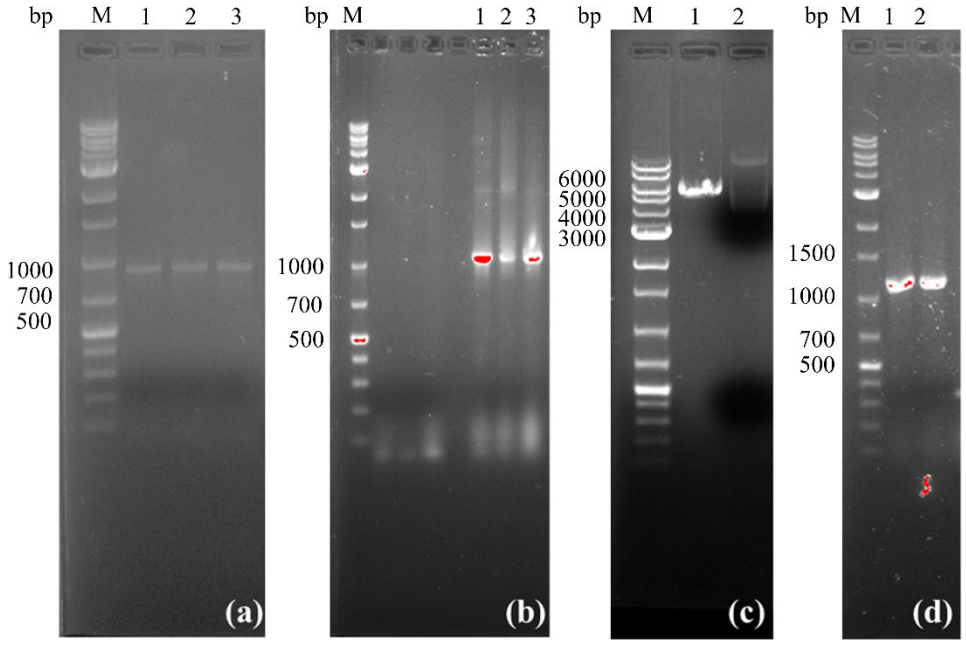

Figure S1 Agarose gel (1%) electrophoresis of PCR products. M: 1kb ladder plus, (a) lines 1−3: *mcp* gene in *Cupriavidus* sp. strain Cd02, (b) lines 1−3: PCR reaction with M13 primers of subcloned product, (c) lane 1: DNA of linearized carrier, lane 2: DNA of pET28a plasmid, (d) line 1−2: Recombinant plasmid transformation *E.coli* BL21(DE3)pLysS competent cells (PCR reaction with T7/T7ter primers of positive clones)

(a)

Stability of recombinant plasmid pET28a-MCP in *E.coli* BL21(DE3)plySs

Recombinant plasmid	Survival rate of positive clones under Kan resistance						
	1st	2nd	3rd	4th	5th	6th	7th
pET28a-MCP	100%	100%	100%	100%	100%	100%	100%

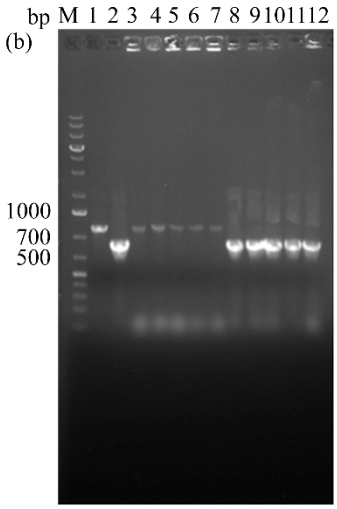

Figure S2 (a) Stability of recombinant plasmid pET28a-MCP in *E.coli* BL21(DE3)plySs. (b) Agarose gel (1%) electrophoresis of PCR products for seventh generation. M: 1kb ladder plus, lane 1−2: the recombinant plasmids were PCR with T7/T7-ter primers and MCP-BD-F/R primers, respectively, lane 3−7: PCR of the 7th generation colonies with T7/T7-ter primers, lane 8−12: PCR of the 7th generation colonies with MCP-BD-F/R primers

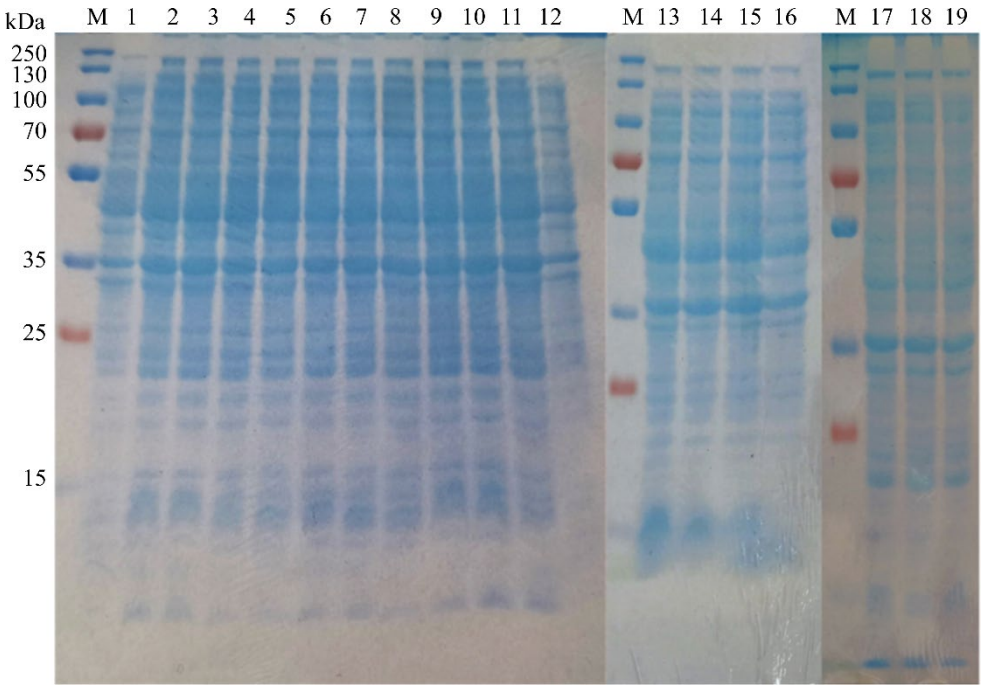

Figure S3 Optimization of heterologous protein expression in *E.coli* BL21(DE3)pLysS. M：marker; lines 1−12: IPTG concentration (0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0 and 2.0 mmol/L); lines 13−16: temperature (16, 22, 30, and 37℃); lines 17−19: time (10, 16, and 24 h), respectively

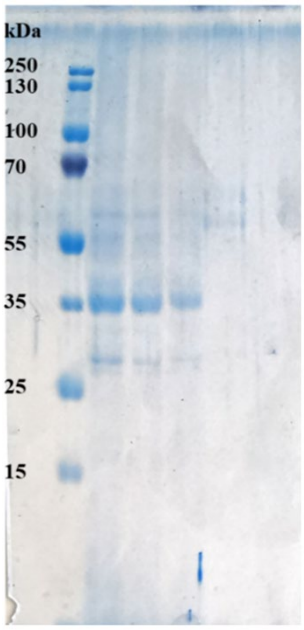

Figure S4 Purification diagrams of MCP

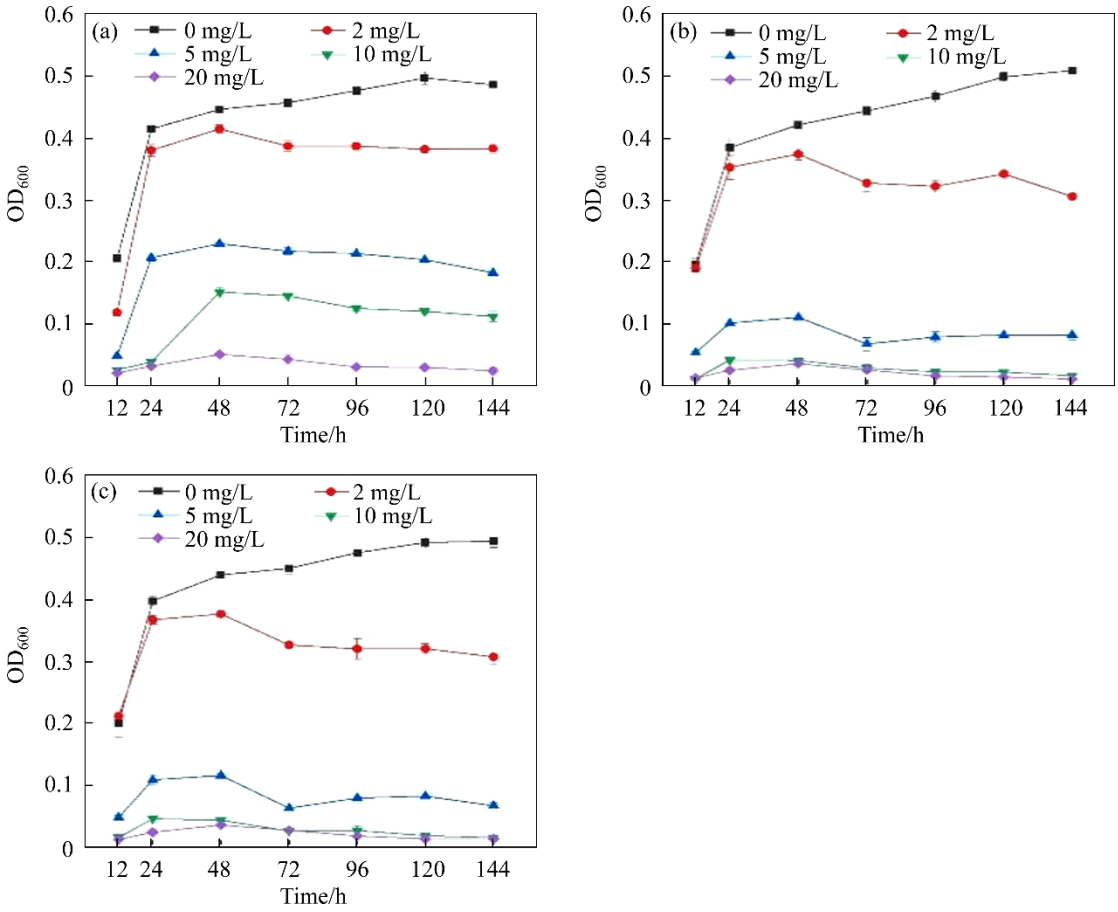

Figure S5 Growth curves of bacteria at different concentrations of Cd^{2+}: (a) GEM01; (b) *E.coli* BL21(DE3)pLysS-pET28a; (c) *E. coli* BL21(DE3)pLysS

Table S1 PCR/qPCR procedures and primers

Primers	Sequences (5'-3')	T_m/°C	Usage
MCP-F	CATATGGTTAGTCGCCCA	58	For subclones
MCP-R	GGATCCTCAGCGTTGTC		
M13-F	TGTAAAACGACGGCCAGT	53	For subclones
M13-R	CACACAGGAAACAGCTATGAC		
T7	ATGCGTCCGGCGTAGA	55	For verify the pET28a plasmid
T7-Ter	GCTAGTTATTGCTCAGCGG		
MCP-BD-F	tggtgccgcgcggcagccatatgATGGTTAGTCGCCCAGCGTCATCCG	58	For one-step cloning (Lower case letters are homologous arms)
MCP-BD-R	acggagctcgaattcggatccTCAGCGTTGTCGCGACAATTCCTTCAATGC		
MCP-q-F	GGAAGCCGATGGTTAGTC	58	For qPCR
MCP-q-R	TCACGAGATAGTCAGAGGAA		

The PCR and qPCR cycle was set up as follows: an initial start at 95 °C for 30 s, followed by 45 cycles of denaturation at 95 °C for 10 s, annealing for 20 s, and extension at 72 °C for 20 s.

Table S2 Parameters of kinetic models for Cd^{2+} adsorption on GEM01 and CK

Model	Parameter	GEM01	CK
Pseudo-first-order model	Q_e/(mg·g^{-1})	6.979	3.292
	k_1/h^{-1}	0.1575	0.2405
	R^2	0.8638	0.9707
	χ^2	1.263	0.1702
Pseudo-second-order model	Q_e/(mg·g^{-1})	7.964	3.775
	k_2/(g·(mg·h)$^{-1}$)	0.02163	0.06847
	R^2	0.9215	0.9892
	χ^2	0.6554	0.05728
Elovich model	α/(mg·(g·h)$^{-1}$)	2.019	1.341
	β/(g·mg^{-1})	0.5178	1.114
	R^2	0.9765	0.9788
	χ^2	0.1846	0.1069
Intra-particle diffusion model	C/(mg·g^{-1})	0.3791	0.1850
	k_{ip}(h^{-1}	1.289	0.6126
	R^2	0.9801	0.8722
	χ^2	0.3506	0.6429

Table S3 Parameters of isotherm models for Cd^{2+} adsorption on GEM01 and CK

Model	Parameter	GEM01	CK
Langmuir	q_e/(mg·g^{-1})	13.18	8.851
	K_L/(L·mg^{-1})	0.3783	0.2419
	R^2	0.9051	0.7827
	χ^2	2.338	1.308
Freundlich	K_F/(L·g^{-1})	3.222	1.628
	n	1.582	1.005
	R^2	0.8786	0.7671
	χ^2	3.905	2.255
Redlich Peterson	α_{RP}/(L·mg^{-2})	0.03929	0.01328
	β	2.274	2.761
	K_{RP}/(L·mg^{-1})	4.022	1.749
	R^2	0.9581	0.8701
	χ^2	1.459	0.8691