An engineered polypeptide around nano-sized manganese-

calcium oxide: Copying plants for water oxidation

Mohammad Mahdi Najafpour^{ab*}, Mohadeseh Zarei Ghobadi, ^{‡a} Bahram Sarvi^{‡a} and Behzad Haghighi^{a-c}

^aDepartment of Chemistry, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, 45137-66731, Iran

^bCenter of Climate Change and Global Warming, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, 45137-66731, Iran

^cDepartment of Chemistry, College of Sciences, Shiraz University, Shiraz 71454, Iran

*Corresponding author; Phone: (+98) 24 3315 3201; E-mail: <u>mmnajafpour@iasbs.ac.ir</u>

[‡]These authors contributed equally to the work.



Supplementary Figure S1. Mass spectroscopy result for G₇HV₂(TV₂)₂.

Product Name	:EV-16							
Instrument No	:0200352							
Lot No	:P130929-XL369359							
Columan	:4.6*250mm, kromasil C18-5							
Solvent A	:0.1%Trifluoroacetic in 100% Acetonirile							
Solvent B	:0.1%Triflue	proacetic	in 100% Water					
Gradient	:	А	В					
	0.01min	30%	70%					
	25.0min	55%	45%					
	25.01min	100%	0%					
	30min	1 Stop						
Flow rate	:1.Oml/min							
Wavelength	:220nm							
Volume	:10ul							



Supplementary Figure S2. HPLC result for G₇HV₂(TV₂)₂.

File Name:	safari.dts		Dispersant N	ame : Water		
Record Number:	: 2380 Dispersant RI: 1.330					
Material RI:	1.33		Viscosity	(cP): 0.8872		
Material Absorbtion:	0.00	Measur	Fime: Sunday, De	Sunday, December 15, 201		
/stem						
Temperature (°C):	25.0		Duration Use	d (s) : 110		
Count Rate (kcps):	74.8	Measu	rement Position (mm): 4.65		
Cell Description:	Disposable si	zing cuvette	Attenu	lator: 6		
esults						
			Diam. (nm)	% Intensity	Width (nm)	
Z-Average (d.nm):	2710	Peak 1:	690.6	100.0	98.17	
Pdl:	0.966	Peak 2:	0.000	0.0	0.000	
Intercept:	0.500	Peak 3:	0.000	0.0	0.000	
Result quality :	Refer to qu	ality report				
		Size Distributio	n by Intensity			
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0	•••••					
0.1	1	10	100 (d.nm)	1000	10000	
		5126	(u.iiii)			
	-					

Size	Mean Number %	Std Dev Number %	Size	Mean Number %	Std Dev Number %	Size	Mean Number %	Std Dev Number %	Size	Mean Number %	Std Dev Number %
0.4000		reamber 30	5.615		Ramber Jo	78.82		Number 70	1106	0.2	Traniber 70
0.4632			6,603	0.0		01.02	0.0		1291	0.2	
0.4032	0.0		7.503	0.0		105.7			1494	0.0	
0.5365	0.0		0701	0.0		100.7	0.0		1710	0.0	
0.6213	0.0		0.721	0.0		122.4	0.0		17.10	0.0	
0.7195	00		10.10	0.0		141.8	0.0		1990	0.0	
0.8332	00		11.70	0.0		164.2	0.0		2305	0.0	
0.9649	0.0		13.54	0.0		190.1	0.0		2669	0.0	
1.117	0.0		15.69	0.0		220.2	0.0		3091	0.0	
1.294	0.0		18.17	0.0		255.0	0.0		3580	0.0	
1.499	0.0		21.04	0.0		295.3	0.0		4145	0.0	
1.736	0.0		24.36	0.0		342.0	0.0		4801	0.0	
2.010	0.0		28.21	0.0		396.1	0.0		5560	0.0	
2.328	0.0		32.67	0.0		458.7	4.0		6439	0.0	
2.696	0.0		37.84	0.0		531.2	16.8		7456	0.0	
3.122	0.0		43.82	0.0		615.1	29.7		8635	0.0	
3.615	0.0		50.75	0.0		712.4	29.0		1.000 e4	0.0	
4.187	0.0		58.77	0.0		825.0	16.0				
4.849	0.0		68.06	0.0		955.4	4.2				





File Name:	safari.dts	Dispersant Name:	Water
Record Number:	2380	Dispersant RI:	1.330
Material RI:	1.33	Viscosity (cP):	0.8872
Material Absorbtion:	0.00	Measurement Date and Time:	Sunday, December 15, 2013

System

Temperature (°C):	25.0	Duration Used (s):	110
Count Rate (kcps):	74.8 Mea	surement Position (mm):	4.65
Cell Description:	Disposable sizing cuvette	Attenuator:	6

Results

			Diam. (nm)	% Intensity	Width (nm)	
Z-Average (d.nm):	2710	Peak 1:	690.6	100.0	98.17	
Pdl:	0.966	Peak 2:	0.000	0.0	0.000	
Intercept:	0.500	Peak 3:	0.000	0.0	0.000	
Result quality :	Refer to quality report					





Supplementary Figure S3. Details for DLS of $G_7HV_2(TV_2)_2/MnCaO_x$ (a-d). We don't use ultrasonic for the DLS experiments.



Supplementary Figure S4. FTIR spectra G₇HV₂(TV₂)₂/MnCaO_x.



Supplementary Figure S5. UV-Vis spectrum of $G_7HV_2(TV_2)_2/MnCaO_x$. The arrow shows UV-VIS peak for Mn(III)/(IV).



Supplementary Figure S6. Water oxidation. Set-up for electrochemical water oxidation.