

Supplementary Information

Nano-size layered manganese-calcium oxide as an efficient and biomimetic catalyst for water oxidation under acidic conditions: comparable to platinum

Mohammad Mahdi Najafpour^{1,2*}, Kevin Leonard³, Fu-Ren F. Fan³, Mahmoud Amouzadeh Tabrizi¹, Allen J. Bard^{3*}, Cecil K. King'ondeu⁴ and Steven L. Suib^{4,5}, Behzad Haghighi^{1,2}, Suleyman I. Allakhverdiev^{6,7}

¹*Department of Chemistry, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, 45137-66731, Iran*

²*Center of Climate Change and Global Warming, Institute for Advanced Studies in Basic Sciences (IASBS), Iran.*

³*Center for Electrochemistry, Department of Chemistry and Biochemistry, The University of Texas at Austin, Austin, TX, 78712-0165, USA*

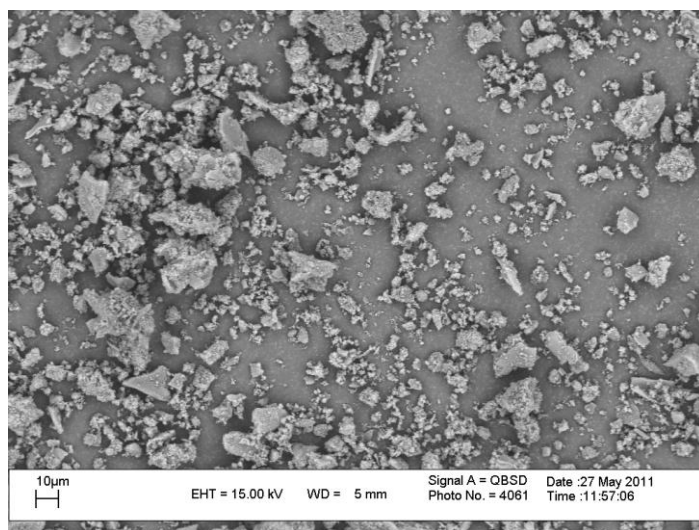
⁴*Department of Chemistry, University of Connecticut, 55 N. Eagleville Rd., Unit 3060, Storrs, CT 06269-3060, USA.*

⁵*Institute of Materials Science, University of Connecticut, Storrs, CT 06269, USA*

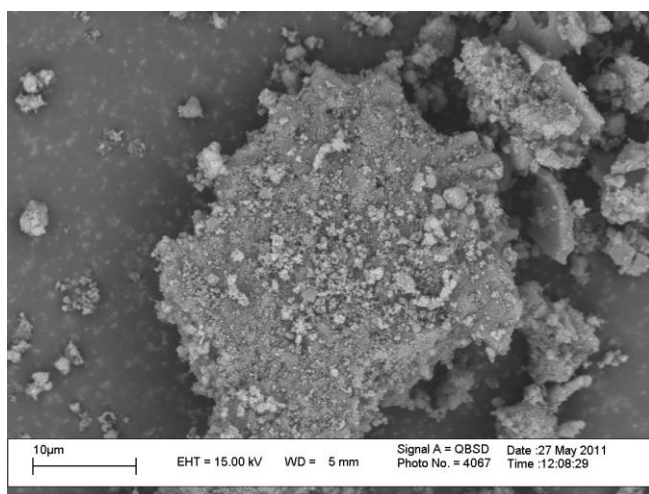
⁶*Controlled Photobiosynthesis Laboratory, Institute of Plant Physiology, Russian Academy of Sciences, Botanicheskaya Street 35, Moscow 127276, Russia*

⁷*Institute of Basic Biological Problems, Russian Academy of Sciences, Pushchino, Moscow Region 142290, Russia*

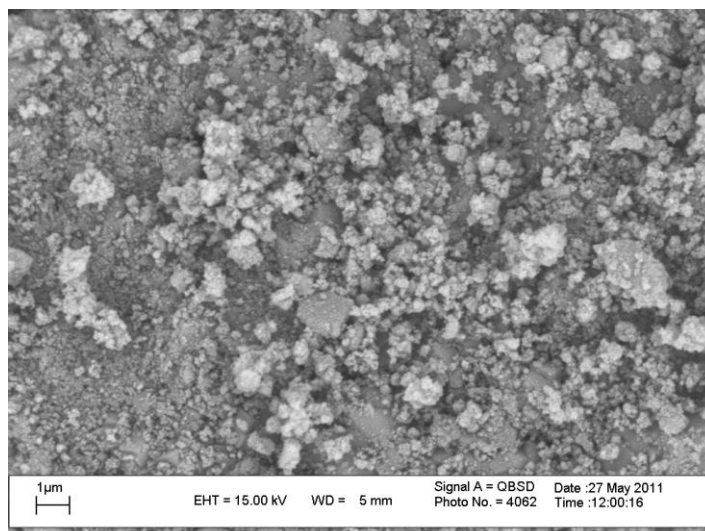
*Corresponding authors; Phone: (+98) 241 415 3201; Fax: (+98) 241 415 3232; E-mail: mmnajafpour@iasbs.ac.ir (MMN); Phone: (+7) 496 7731 837; Fax: (+7) 496 7330 532.



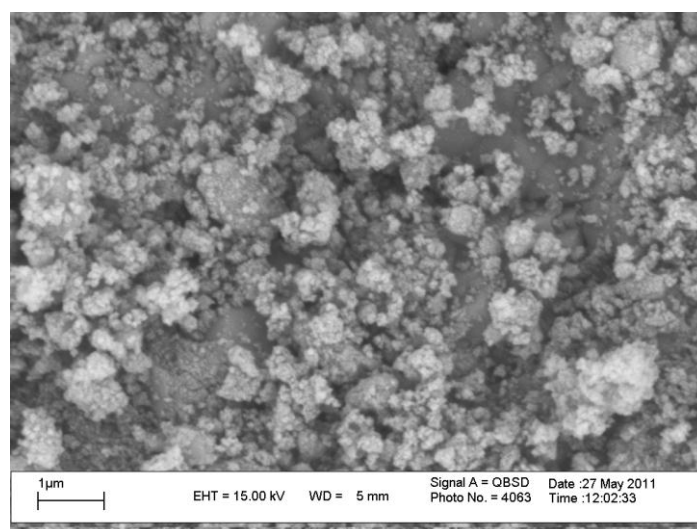
a



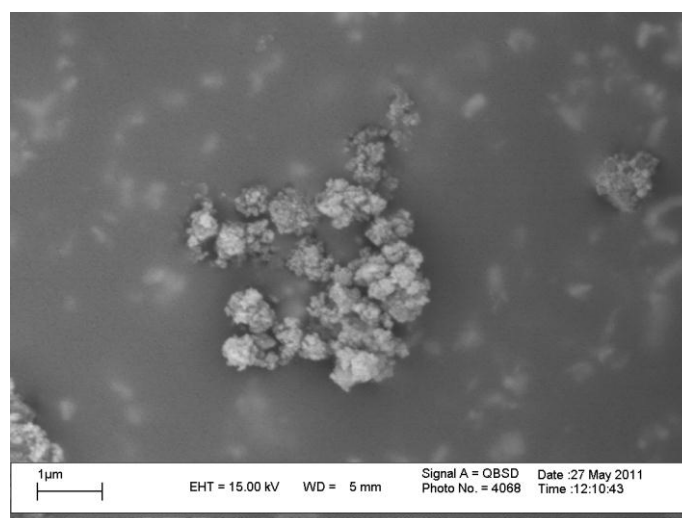
b



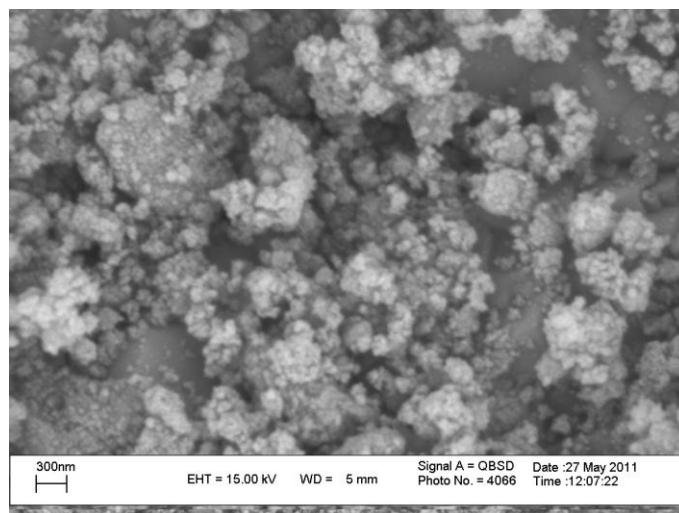
c



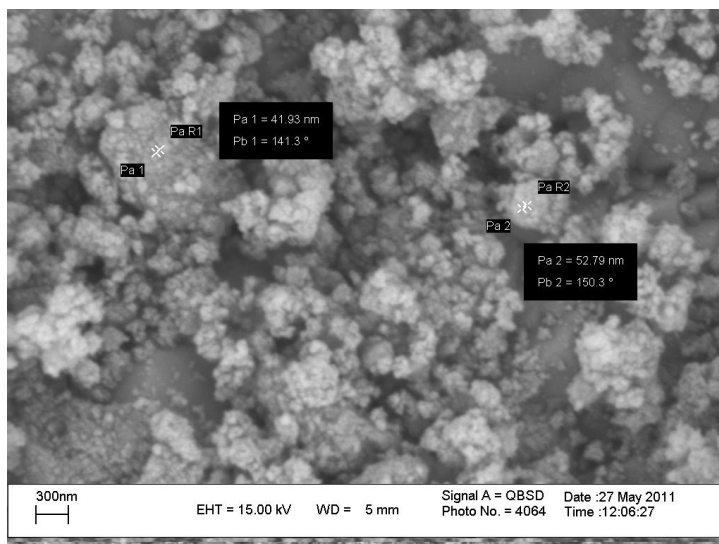
d



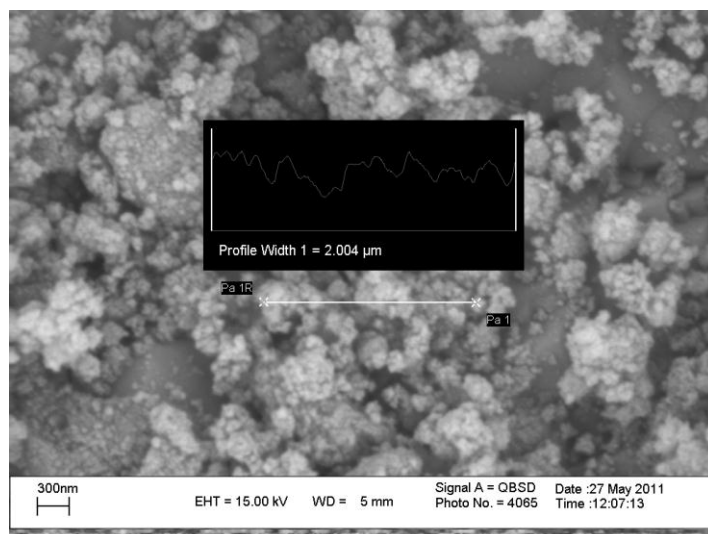
e



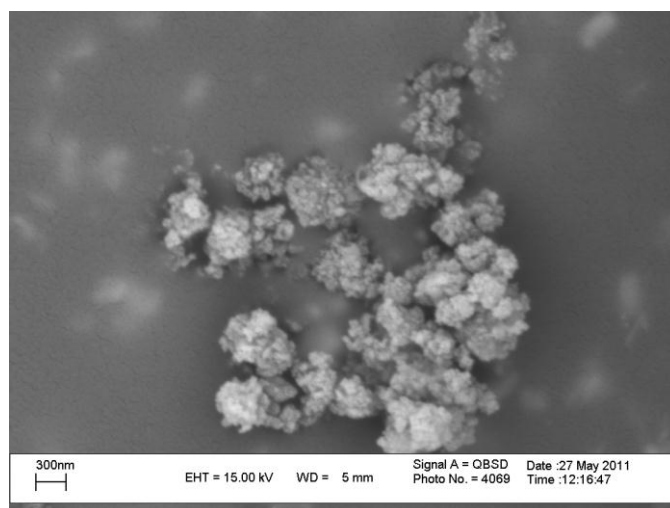
f



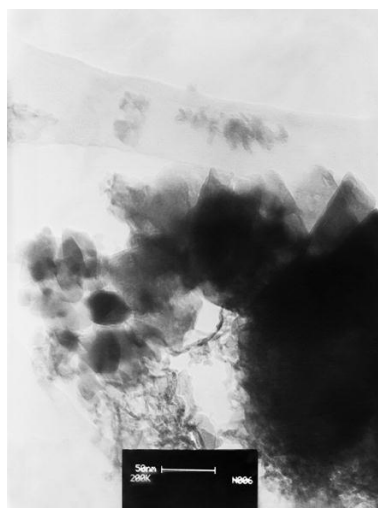
g



h



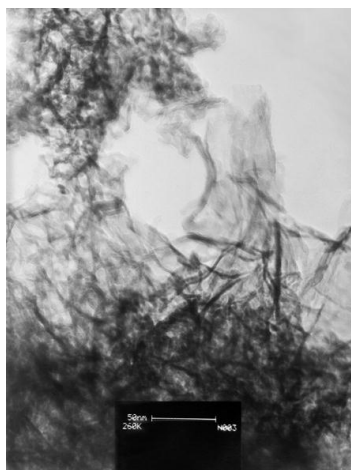
i



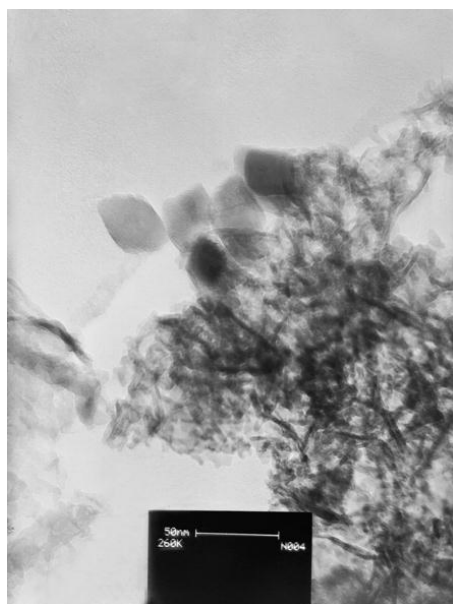
g



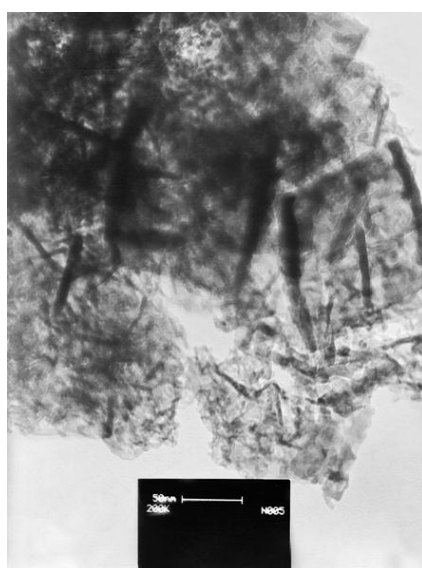
h



k



l



7

m

Fig. S1. SEM micrographs of nano size manganese calcium oxide (a-i). TEM images of nano size manganese calcium oxide (g-m). Scale bar for all TEM images (g-m) is 50 nm.

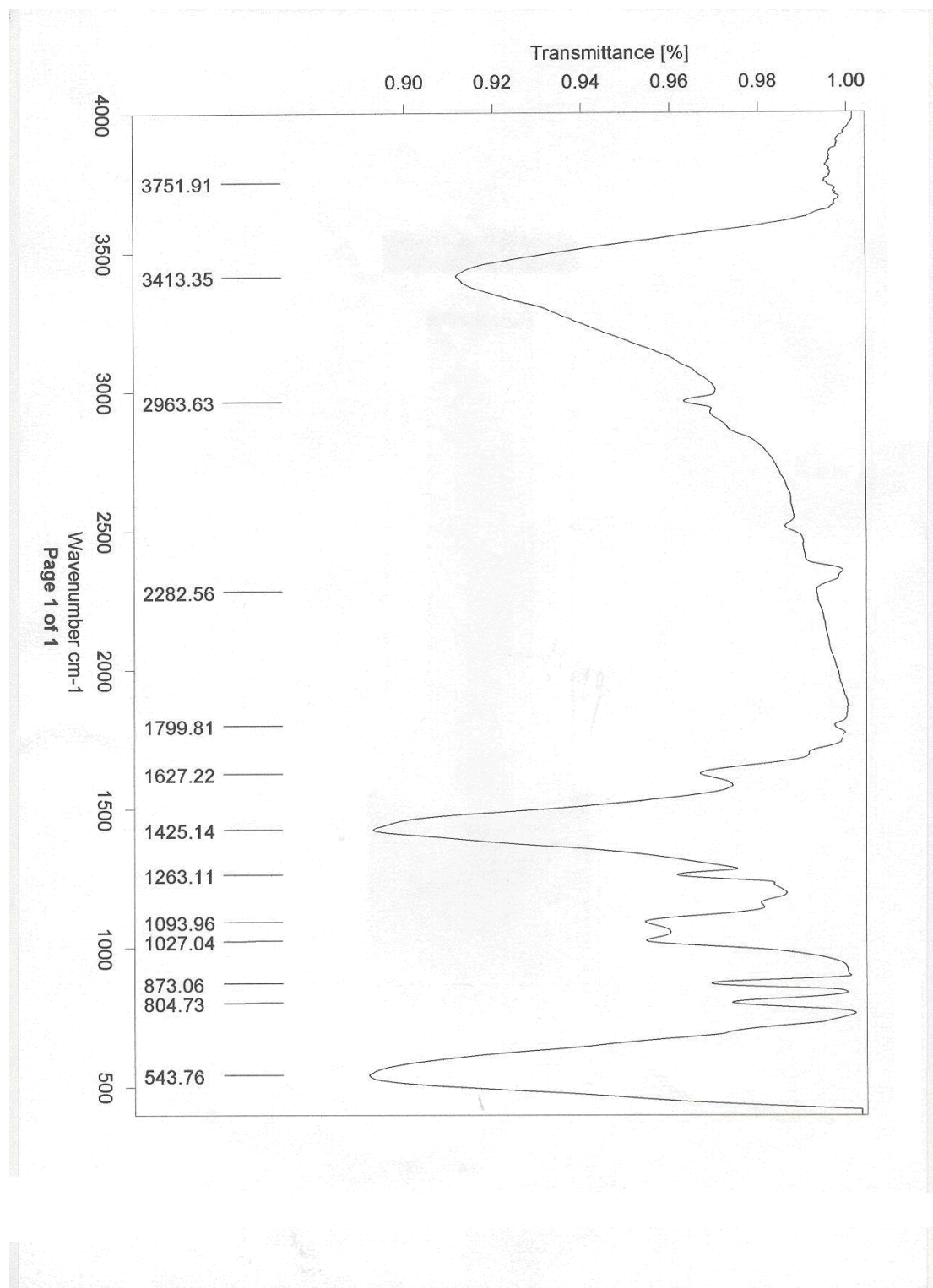


Fig. S2. IR spectrum of the nano-size manganese-calcium oxide.