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Synergetic Nanoporous Mn-Ru Oxides as Efficient Electrocatalysts for Oxygen Reduction Reaction

Mohamed B. Zakaria,[1,2]* and Toyohiro Chikyow[1]*

1 International Center for Materials Nanoarchitechtonics (MANA), National Institute for Materials Science (NIMS), 1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan.

2 Department of Chemistry, Faculty of Science, Tanta University, Tanta, Gharbeya 31527, Egypt.

E-mails: chikyo.toyohiro@nims.go.jp

mohamed.barakat@nims.go.jo

Figure S1

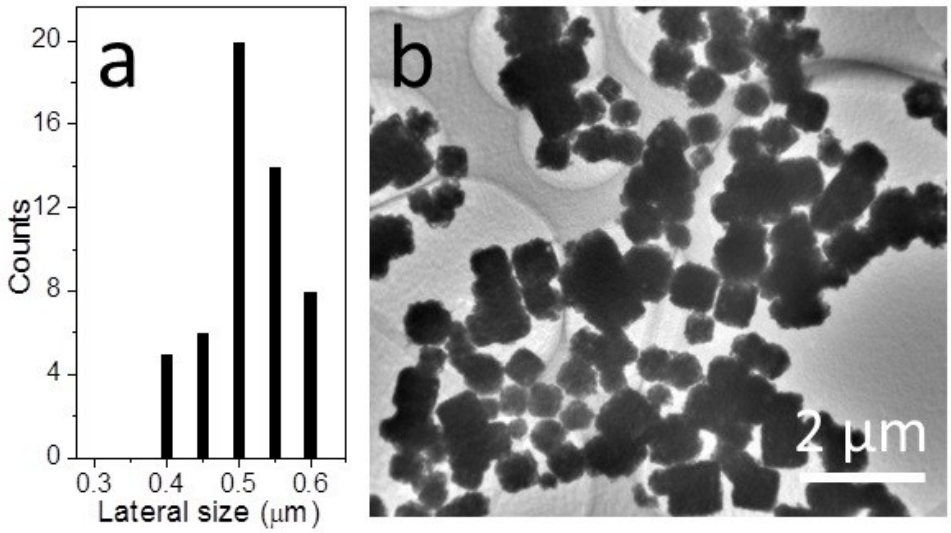
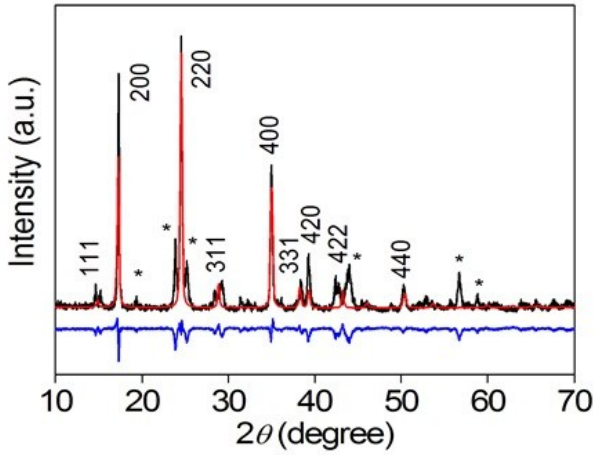


Figure S1 a) The estimated lateral size of the as-prepared Mn-Ru CP nanocubes, and b) the corresponding TEM image.

Figure S2



Crystal system	cubic
Space group	*Fm-3m*
a/Å	10.219 (3)
b/Å	10.219 (3)
c/Å	10.219 (3)
α/°	90
β/°	90
γ/°	90
V/ Å^3	1067.149
Z	1
λ/Å	1.5406
R_p	0.492
R_{wp}	0.579

Figure S2 Experimental XRD patterns (black line), computed XRD patterns (red line), and the residuals (blue line) of the as-prepared Mn-Ru CP nanocubes. The peaks indicated by (*) are generated from impurities.

Figure S3

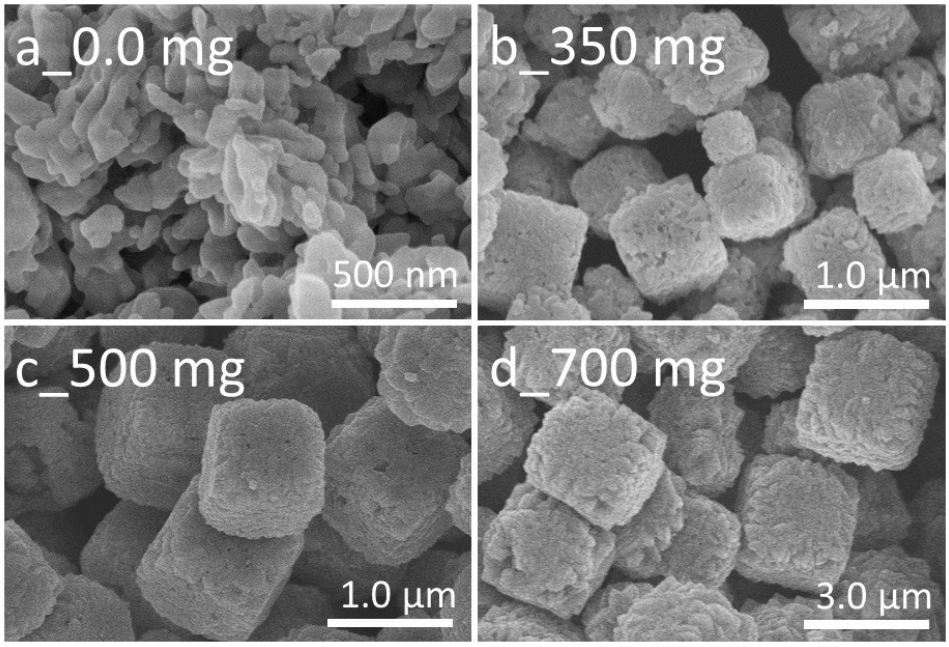


Figure S3 SEM images of the as-prepared Mn-Ru CP using various amounts of TSCD.

Figure S4

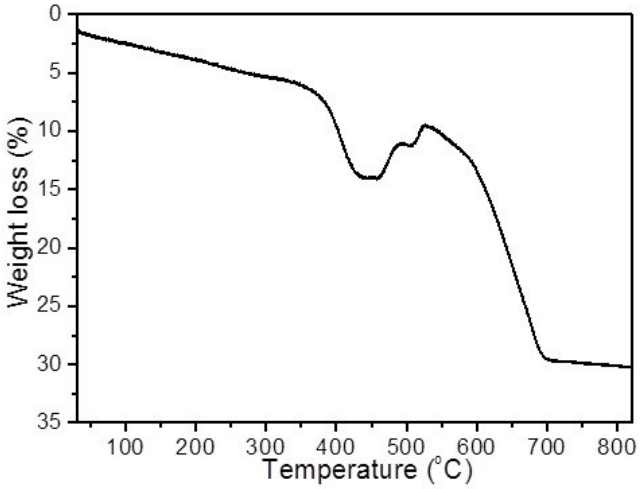


Figure S4 TG curve of the as-prepared Mn-Ru CP nanocubes at a heating rate of 5 °C min^{-1} from room temperature to around 800 °C.

Figure S5

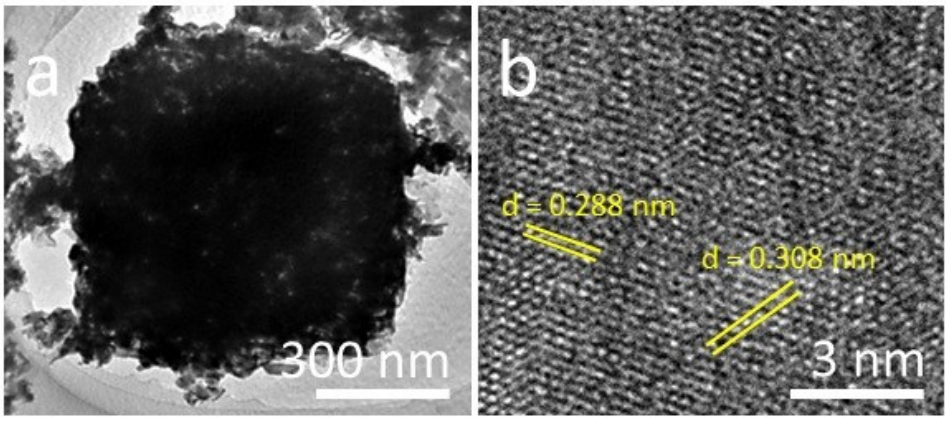


Figure S5 a) TEM image of one cube of the thermally derived nanoporous Mn-Ru oxide and b) the corresponding HRTEM of a selected area.

Figure S6

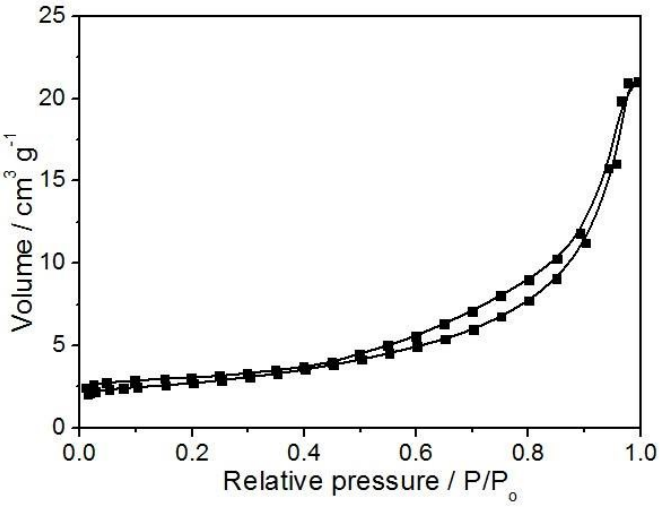


Figure S6 Nitrogen gas adsorption-desorption isotherms of the nanoporous Mn-Ru oxide.

Figure S7

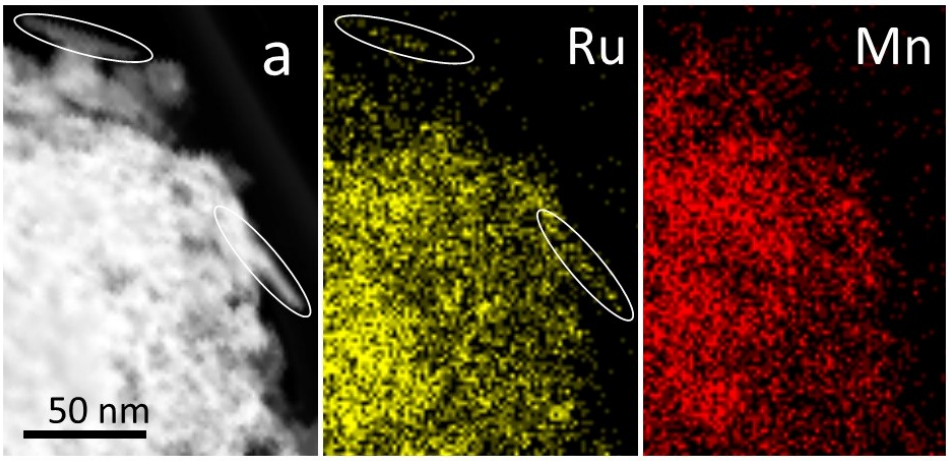


Figure S7 b) High-resolution HAADF-STEM image and the corresponding elemental mapping (Ru and Mn atoms) of the thermally derived nanoporous Mn-Ru oxide.

Figure S8

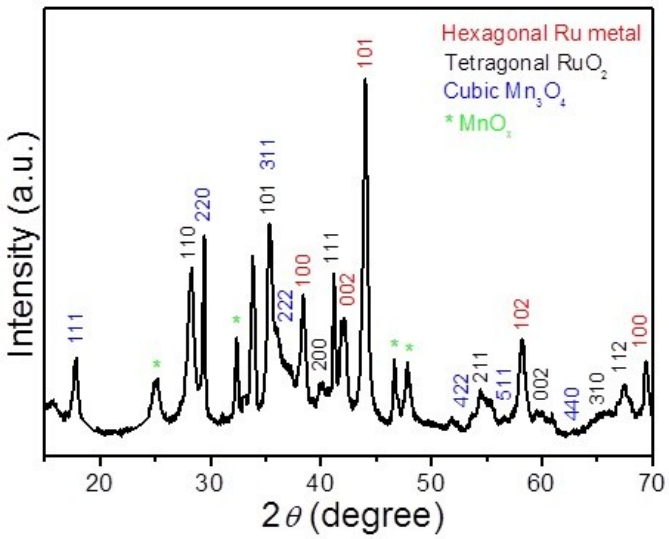


Figure S8 Wide-angle XRD patterns of the thermally derived nanoporous Mn-Ru oxide.

Figure S9

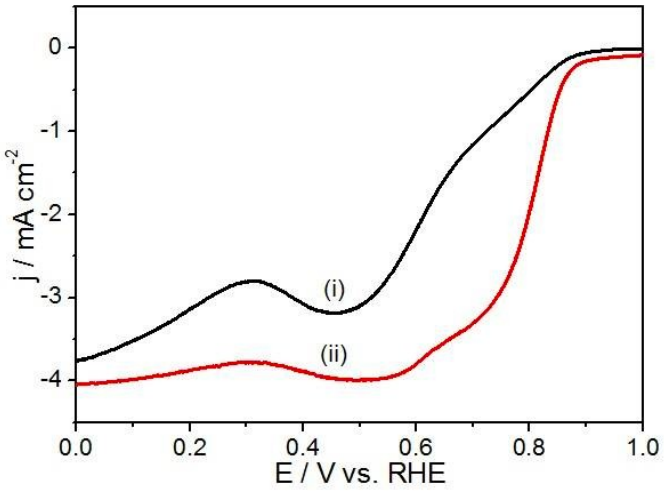


Figure S9 ORR polarization curves of (i) physically mixed Mn-Ru oxides and (ii) nanoporous Mn-Ru oxide recorded in O_2-saturated 0.1 M KOH solution with a sweep rate of 10 mV s^{-1} at a rotation rate of 1600 rpm.