Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Oxygen storage properties of hexagonal $HoMnO_{3+\delta}$.

Konrad Świerczek[a,b], Alicja Klimkowicz[c,*], Kengo Nishihara[c], Shuntaro Kobayashi[c], Akito Takasaki[c], Maleeha Alanizy[d], Stanislaw Kolesnik[d], Bogdan Dabrowski[d], Seungho Seong[e], Jeongsoo Kang[e]

[a]AGH University of Science and Technology, Faculty of Energy and Fuels, Department of Hydrogen Energy, al. A. Mickiewicza 30, 30-059 Krakow, Poland

[b]AGH Centre of Energy, AGH University of Science and Technology, ul. Czarnowiejska 36, 30-054 Krakow, Poland

[c]Shibaura Institute of Technology, Department of Engineering Science and Mechanics, 3-7-5 Toyosu, Koto-ku, 135-8548 Tokyo, Japan

E-mail: klimkowicz.alicja.ewa.j2@shibaura-it.ac.jp

[d]Department of Physics, Northern Illinois University, DeKalb, IL 60115, USA

[e]Department of Physics, The Catholic University of Korea (CUK), Bucheon 14662, Korea

Supporting Information

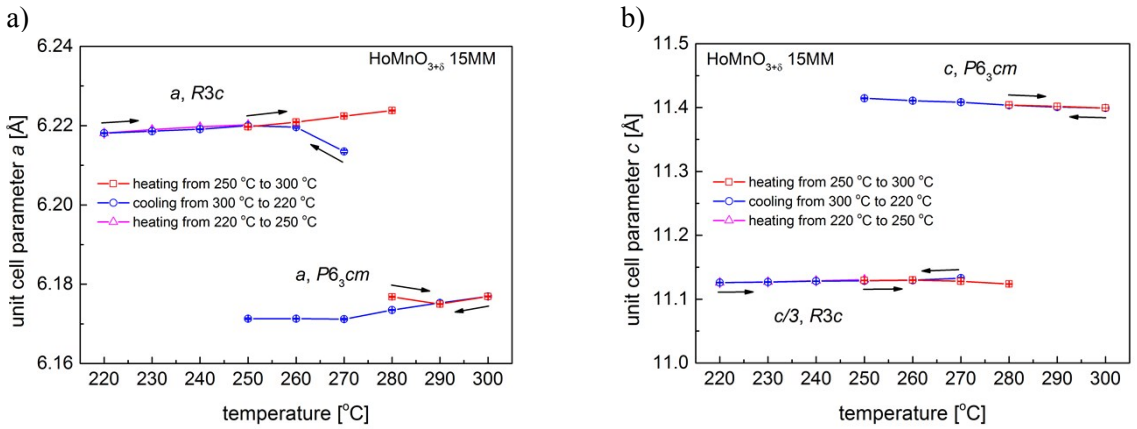

Fig. S1. Evolution of the unit cell parameters of the Hex0 (*P*63*cm*) and Hex1 (*R*3*c*) phases of the $HoMnO_{3+\delta}$ 15MM sample during sequence of the measurements heating, cooling and heating in the oxygen atmosphere for a) parameter *a*; b) parameter *c*.

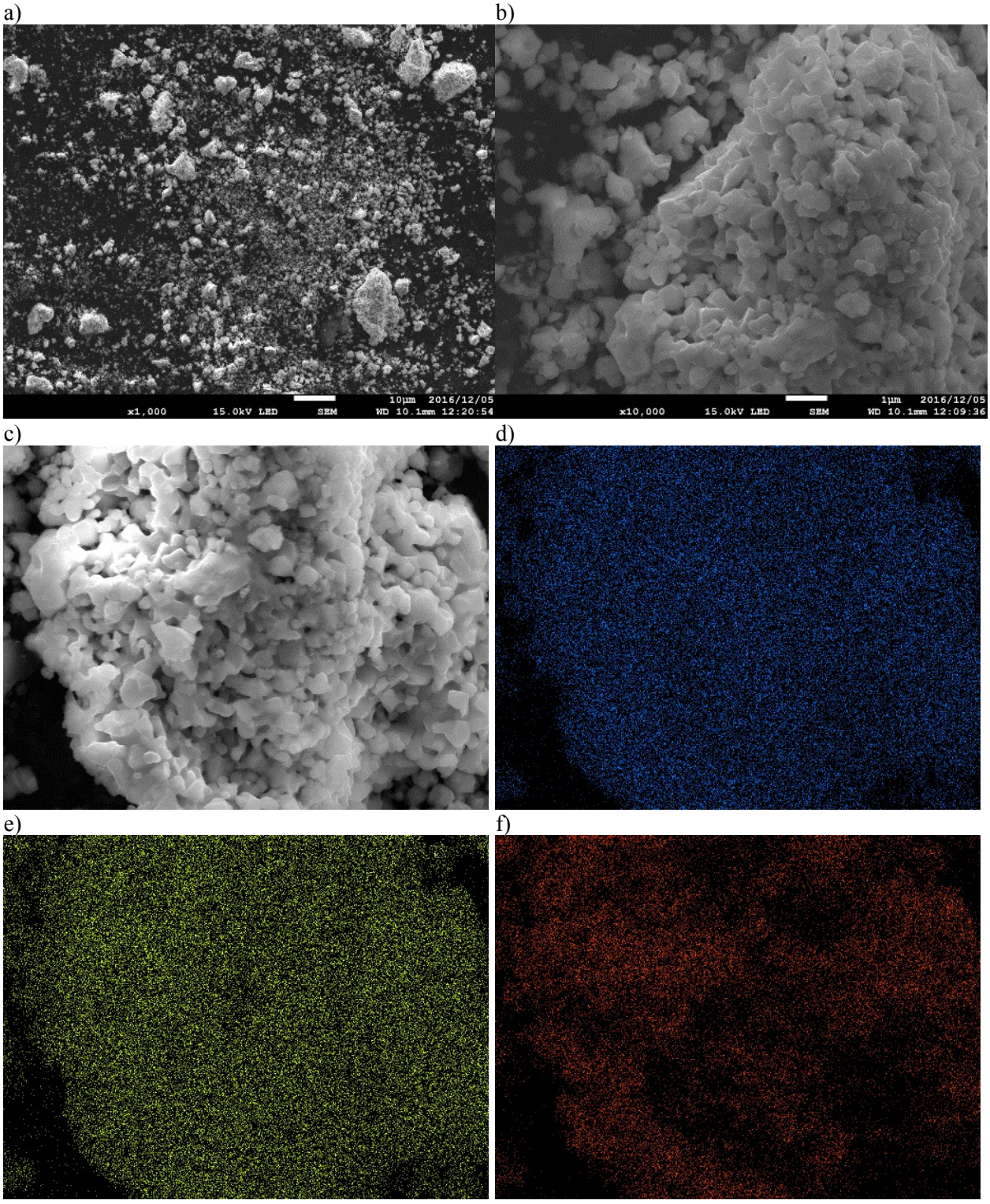

Fig. S2. Micrographs of the as prepared $HoMnO_3$ 0MM powder at different magnifications of a) 1000 and b) 10000. Elemental mappings registered for grain shown in c): d) Ho, e) Mn, f) O.

b)

a)

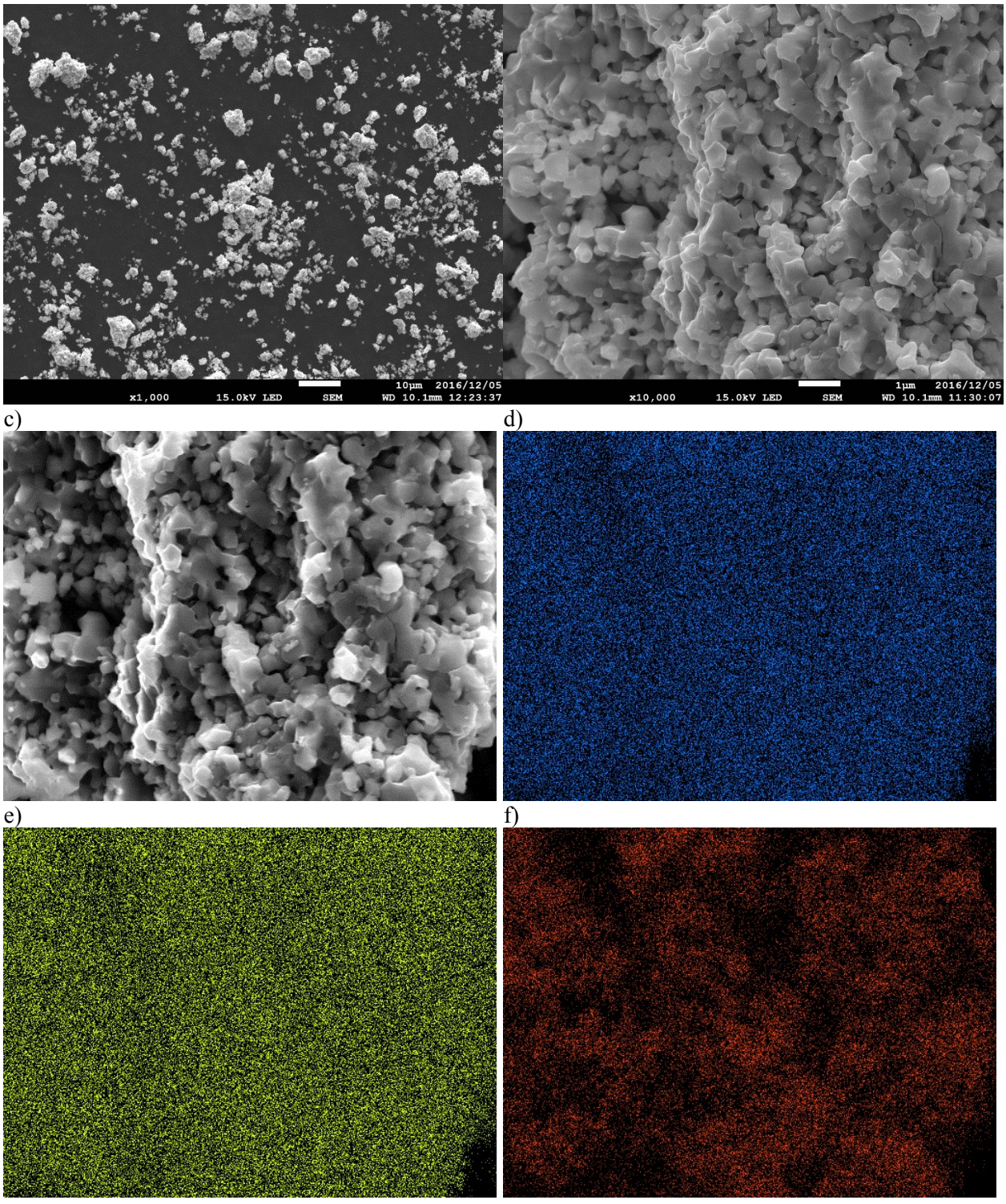

Fig. S3. Micrographs of the as prepared $HoMnO_3$ 15MM powder at different magnifications of a) 1000 and b) 10000. Elemental mappings registered for grain shown in c): d) Ho, e) Mn, f) O.

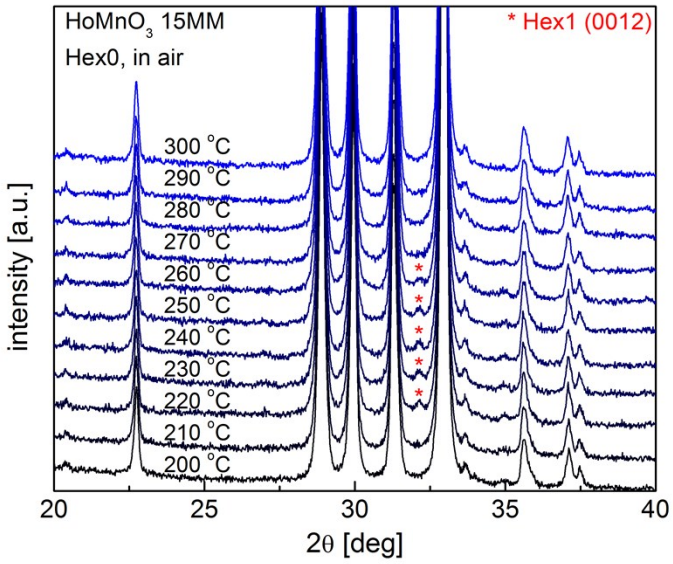

Fig. S4. Structural evolution of the $HoMnO_3$ 15MM material heated in the air atmosphere. Formation of the oxidized Hex1 (*R*3*c*) phase is visible (denoted as 0012 Bragg peak).