

## Supporting Information

# Synthesis of Organized Mesoporous Metal Oxide Films Templated by Amphiphilic PVA-PMMA Comb Copolymer

Do Hyun Kim,<sup>a</sup> Min Su Park,<sup>a</sup> Hyung Hee Cho,<sup>b</sup> Jung Tae Park<sup>\*c</sup>, Jong Hak Kim<sup>\*a</sup>

<sup>a</sup> *Department of Chemical and Biomolecular Engineering, Yonsei University, 50 Yonsei-ro, Seodaemun-gu, Seoul 03722, South Korea*

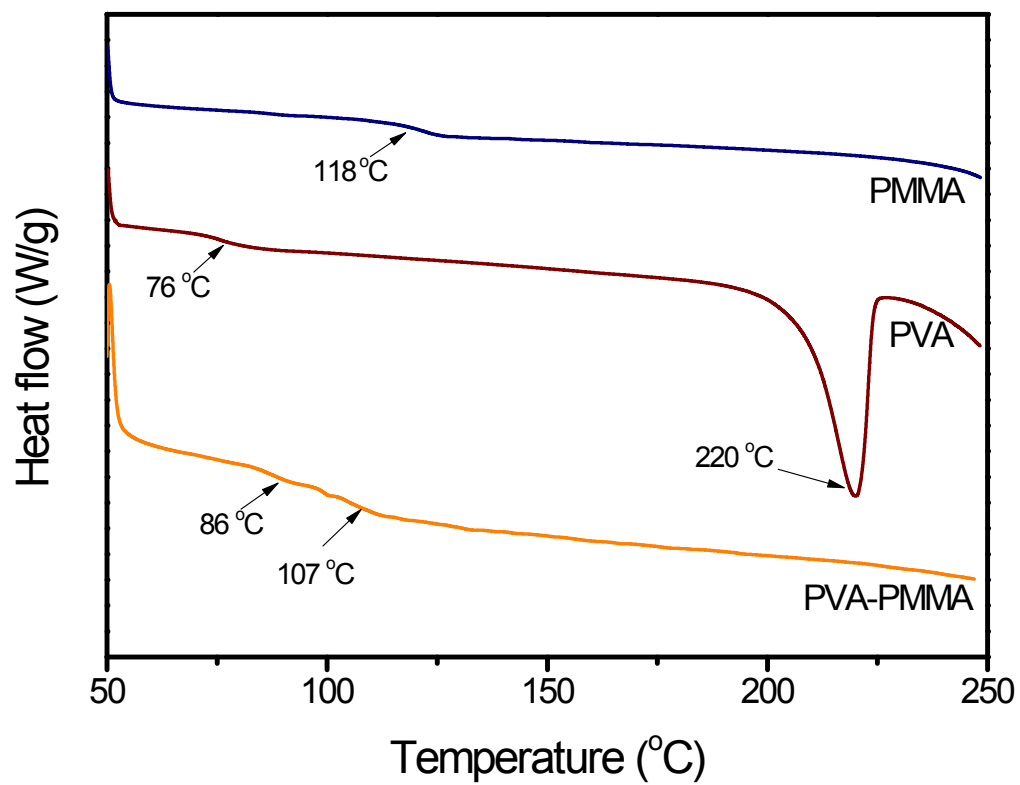
<sup>b</sup> *Department of Mechanical Engineering, Yonsei University, 50 Yonsei-ro, Seodaemun-gu, Seoul 03722, South Korea*

<sup>c</sup> *Department of Chemical Engineering, Konkuk University, 120 Neungdong-ro, Gwangjin-gu, Seoul 05029, South Korea*

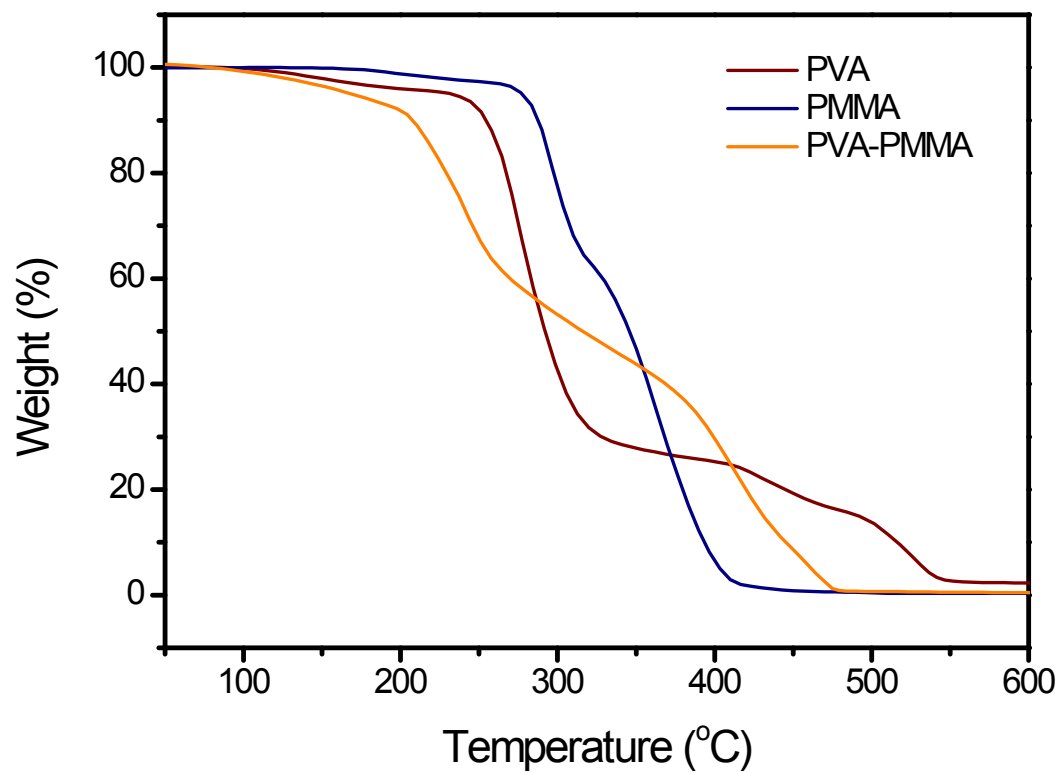
\* To whom correspondence should be addressed

E-mail: [jtpark25@konkuk.ac.kr](mailto:jtpark25@konkuk.ac.kr) (J. T. Park) or [jonghak@yonsei.ac.kr](mailto:jonghak@yonsei.ac.kr) (J. H. Kim)

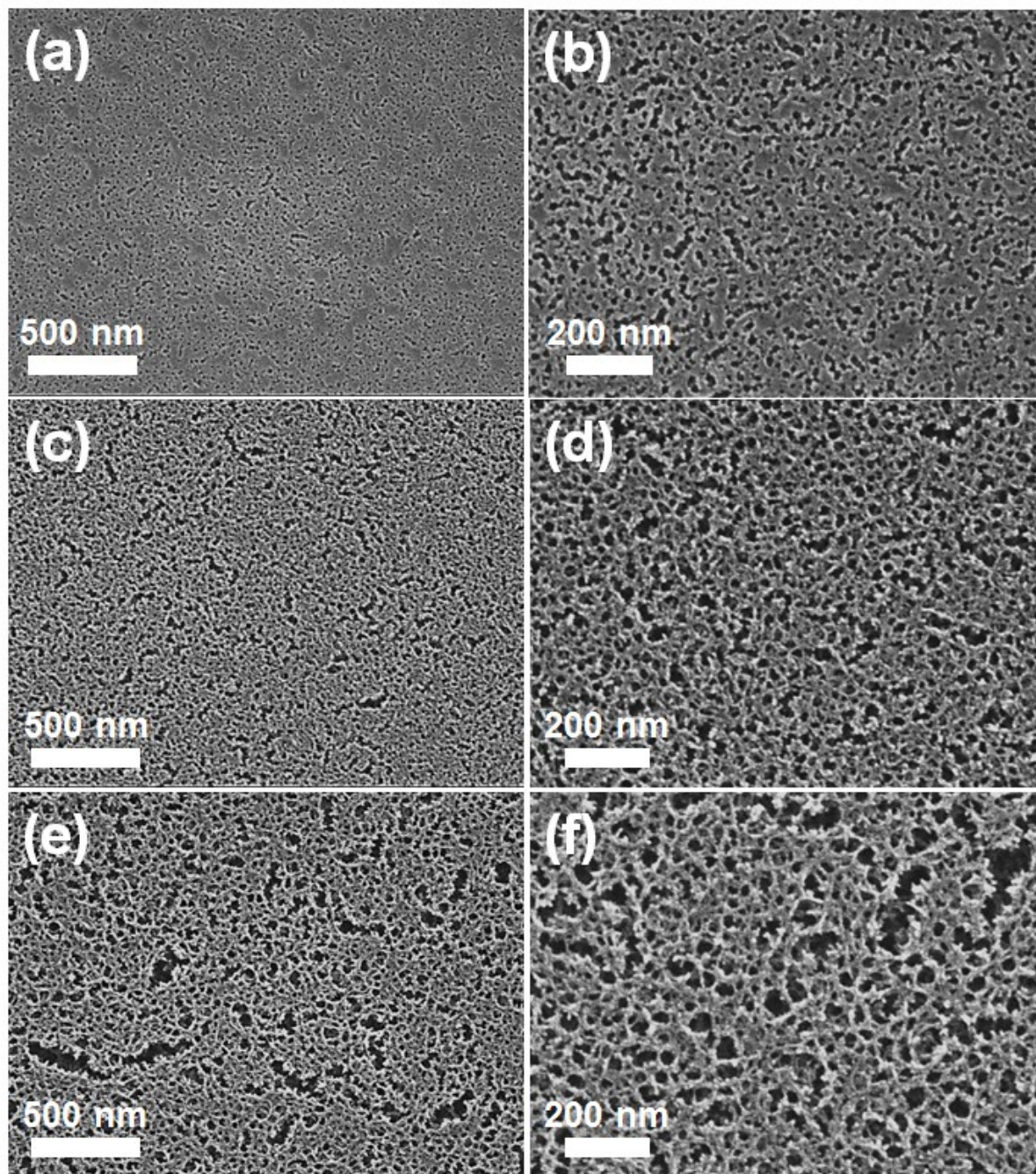
Fig. S1 DSC curves of PVA, PMMA, and PVA-PMMA comb copolymer.



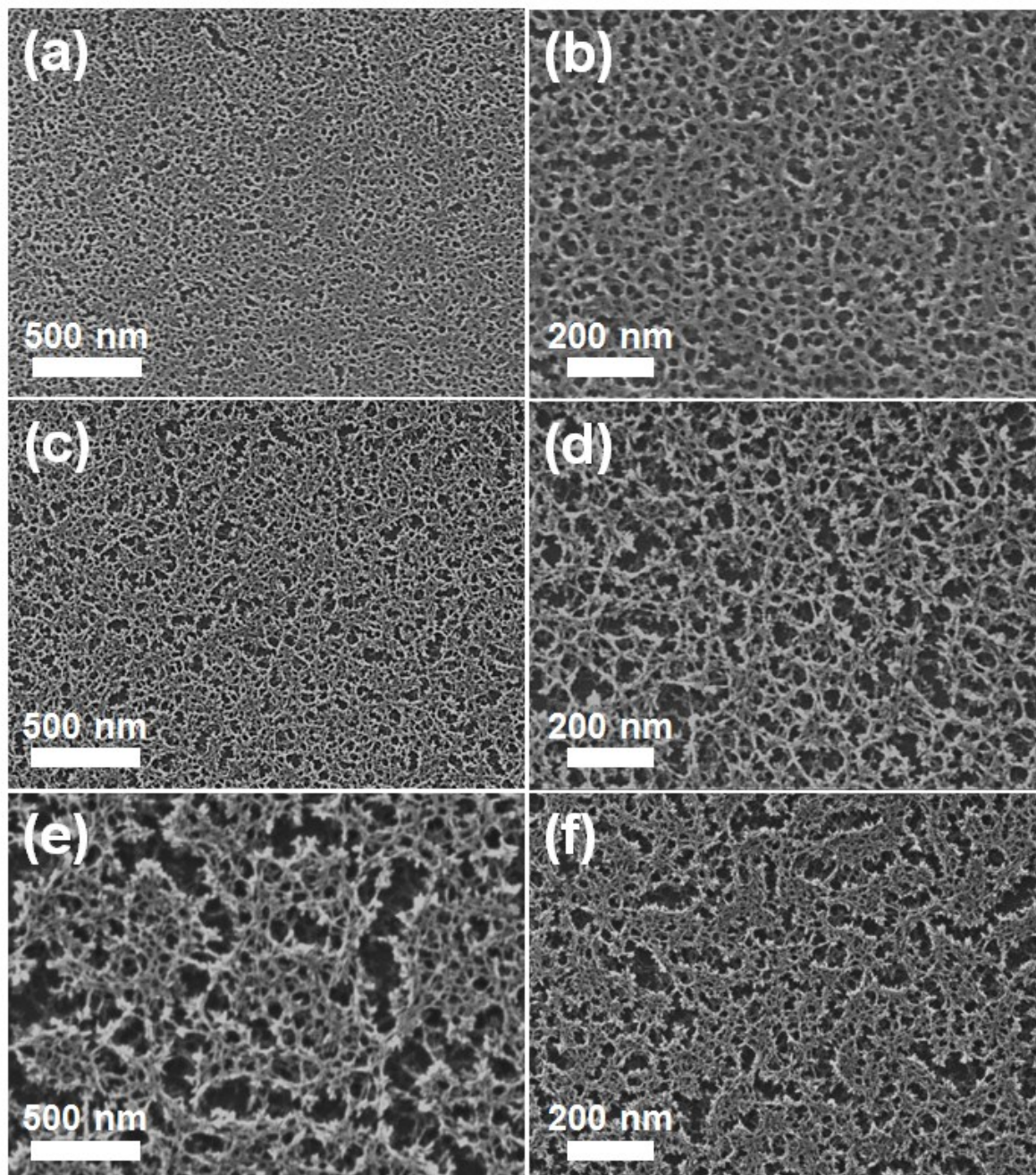
**Fig. S2** TGA curves of PVA, PMMA, and PVA-PMMA comb copolymer.



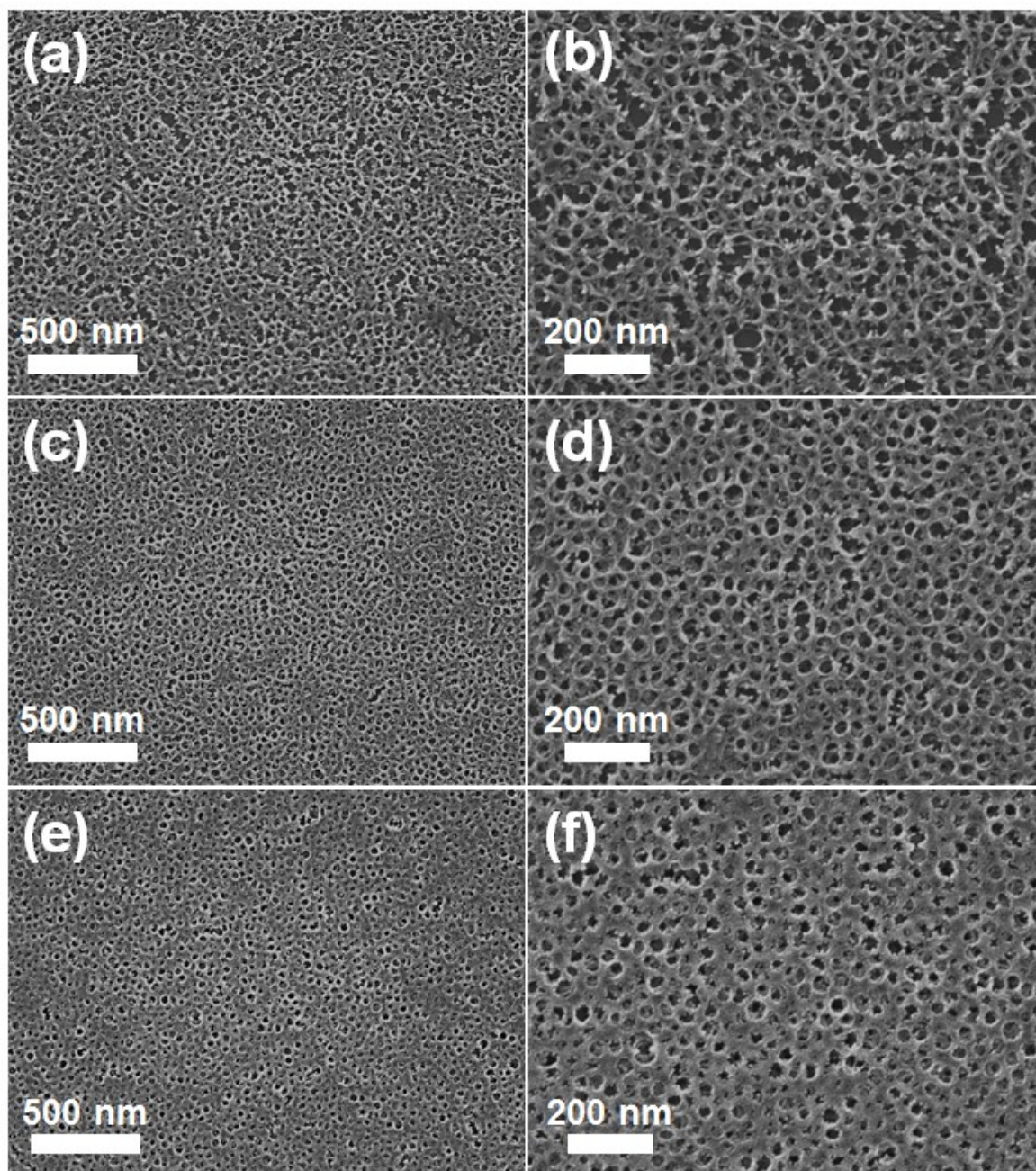
**Fig. S3** FE-SEM images of mesoporous SiO<sub>2</sub> prepared using different PVA-PMMA concentrations at low and high magnification: (a, b) 1%, (c, d) 3%, and (e, f) 5%.



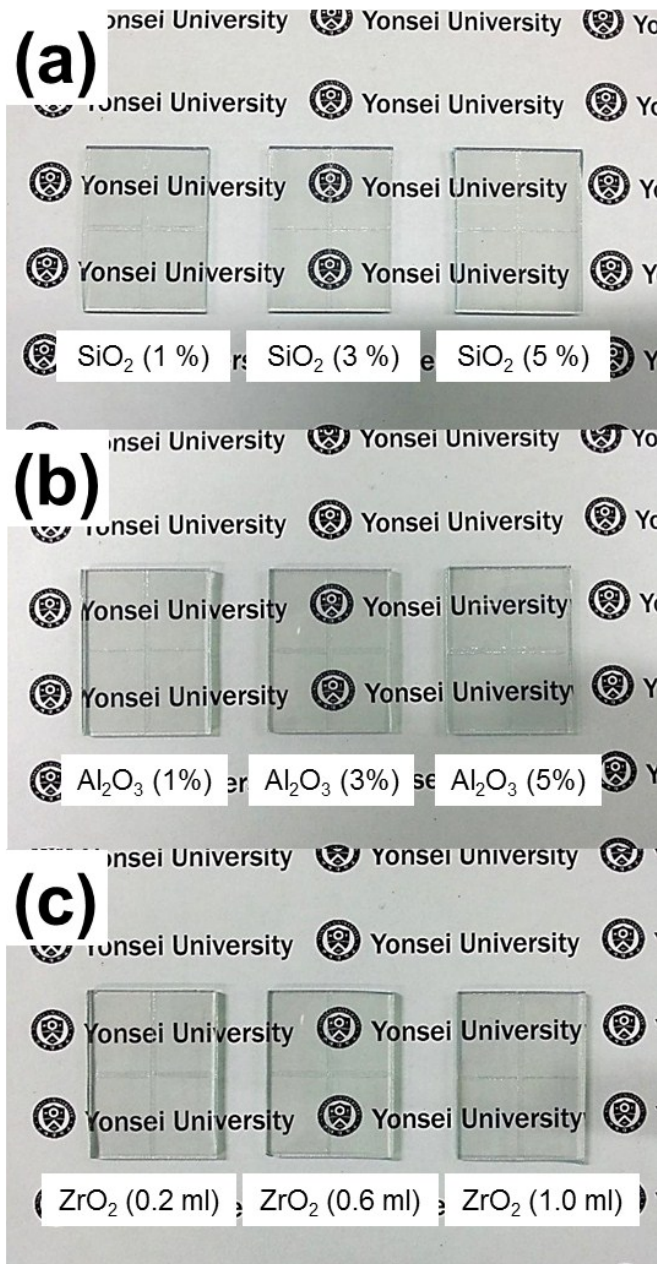
**Fig. S4** FE-SEM images of mesoporous  $\text{Al}_2\text{O}_3$  prepared using different PVA-PMMA concentrations at low and high magnification: (a, b) 1%, (c, d) 3%, and (e, f) 5%.



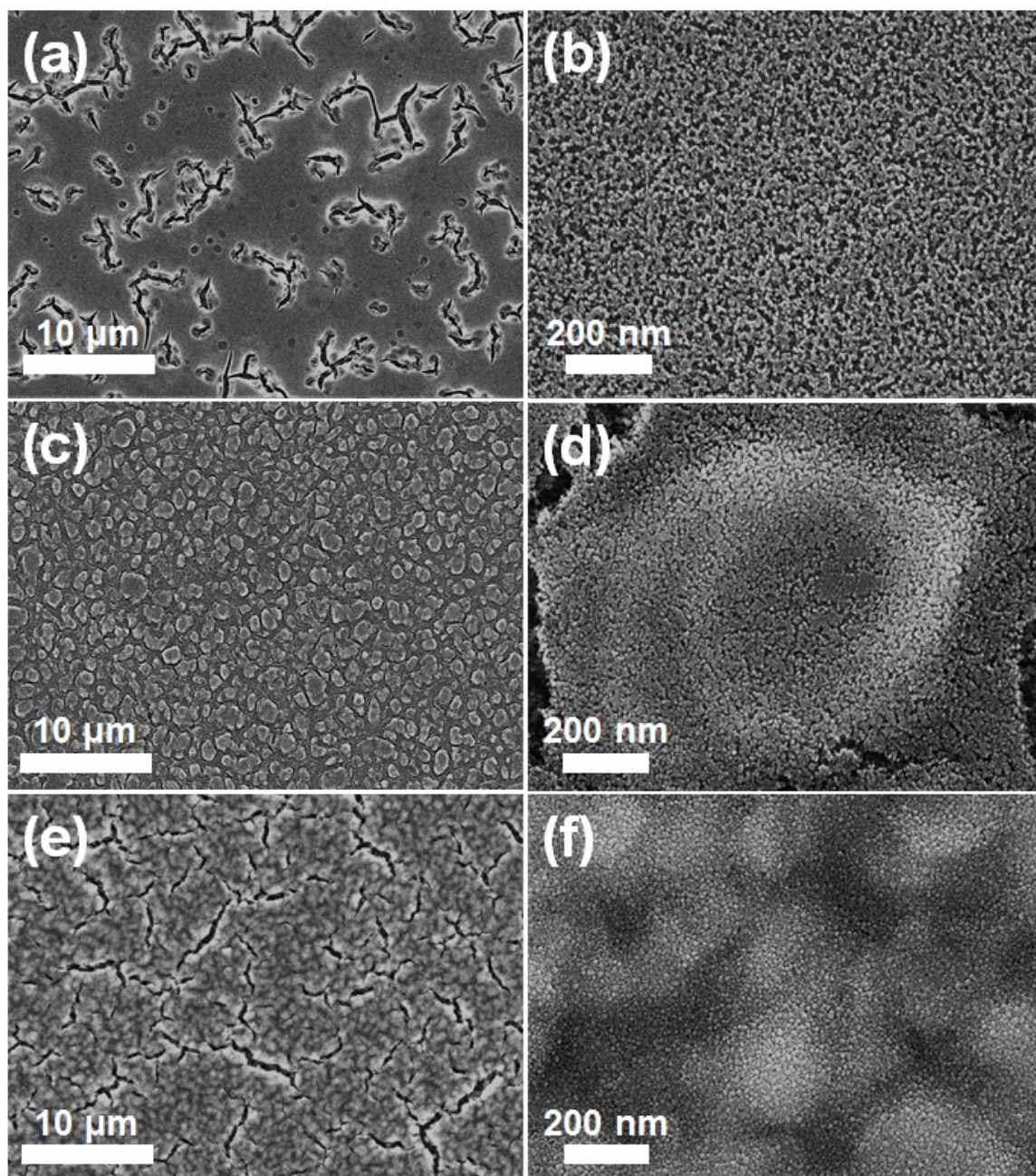
**Fig. S5** FE-SEM images of mesoporous  $\text{ZrO}_2$  prepared using constant PVA-PMMA concentration and different volumes of precursor solution at low and high magnification: (a, b) 0.2 ml, (c, d) 0.6 ml, and (e, f) 1.0 ml.



**Fig. S6** Photographs of mesoporous metal oxide films, (a)  $\text{SiO}_2$ , (b)  $\text{Al}_2\text{O}_3$ , and (c)  $\text{ZrO}_2$ .

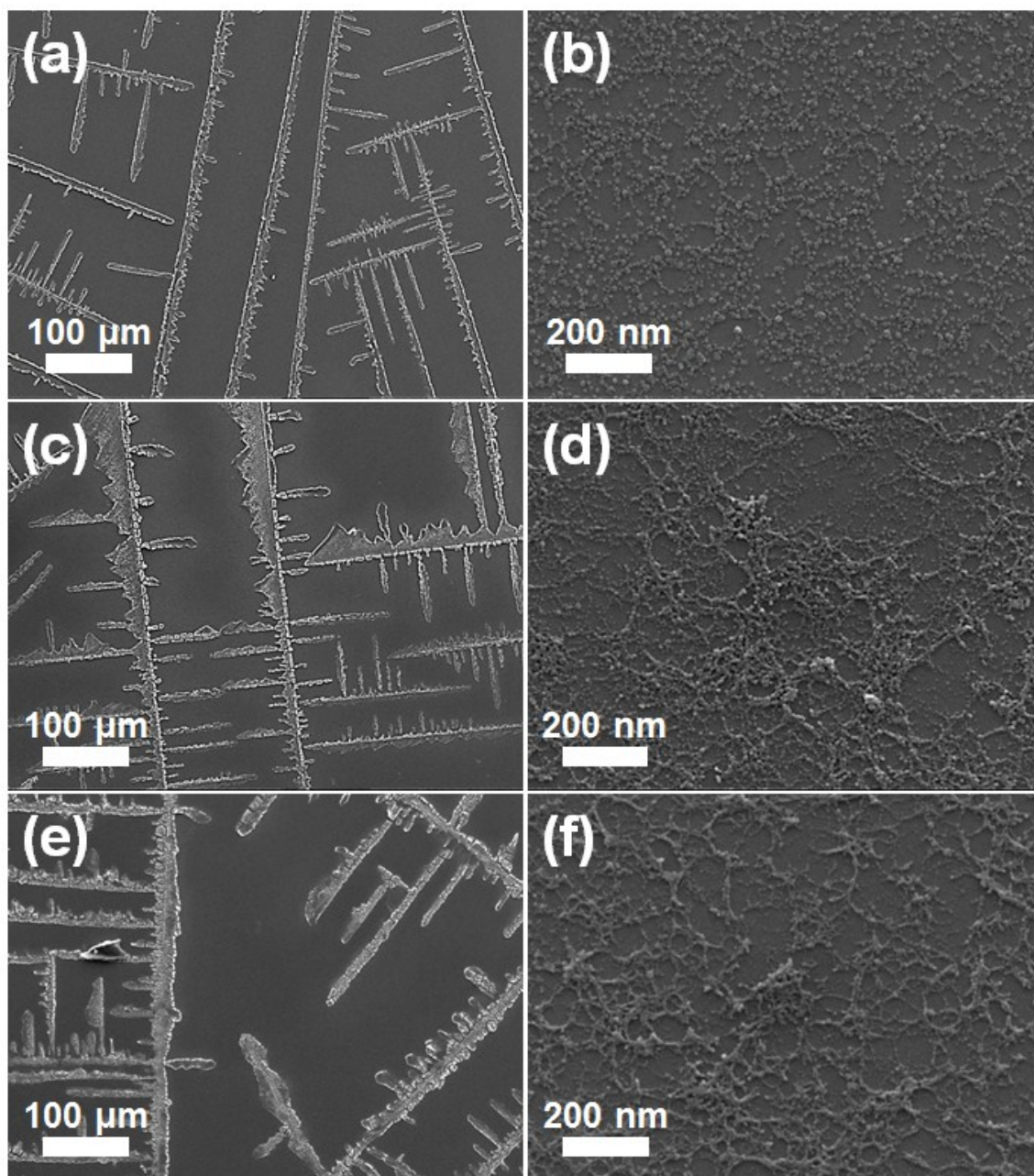


**Fig. S7** FE-SEM images of mesoporous SnO<sub>2</sub> prepared using different PVA-PMMA concentrations at low and high magnifications: (a, b) 1%, (c, d) 3%, and (e, f) 5%.

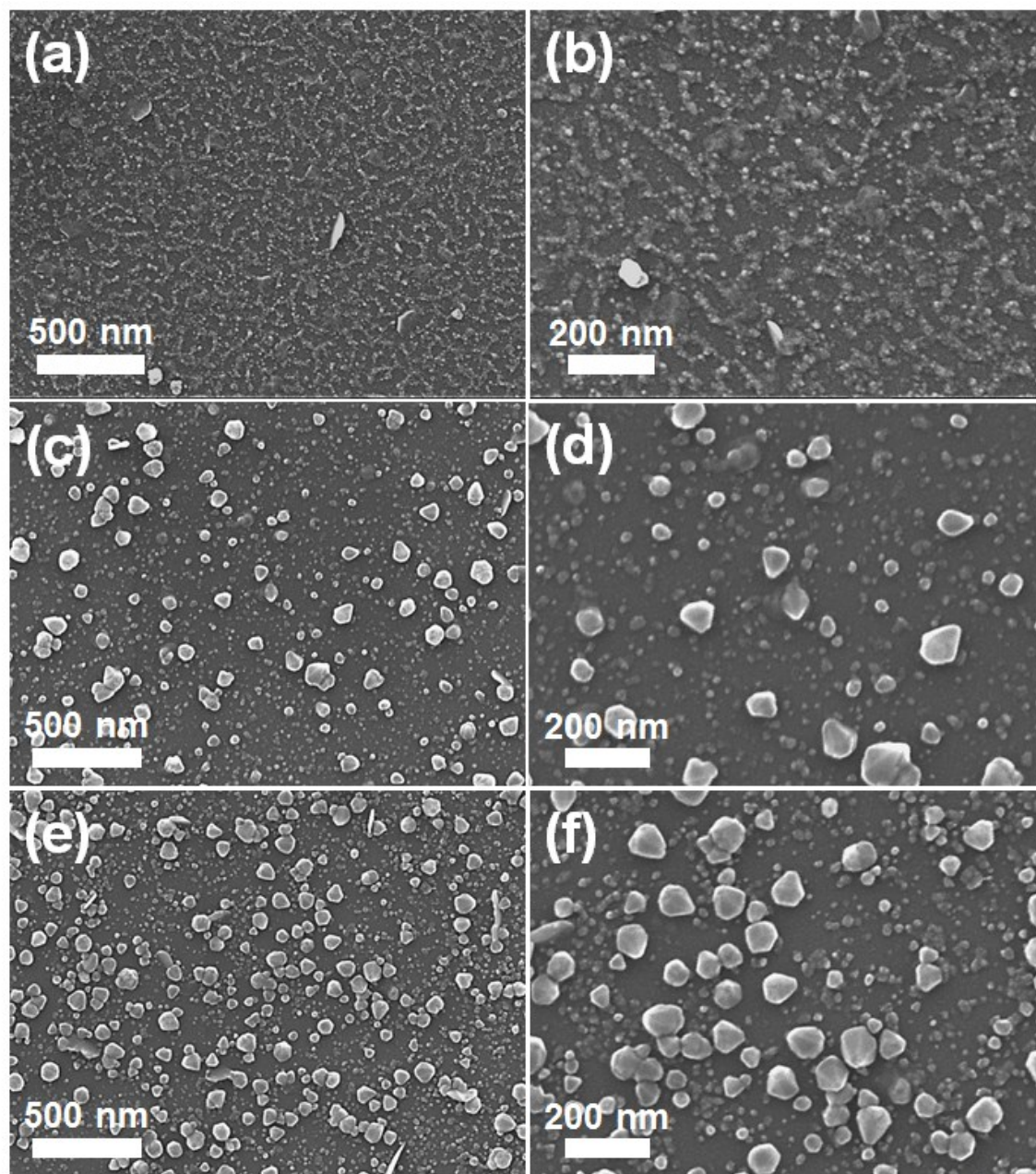




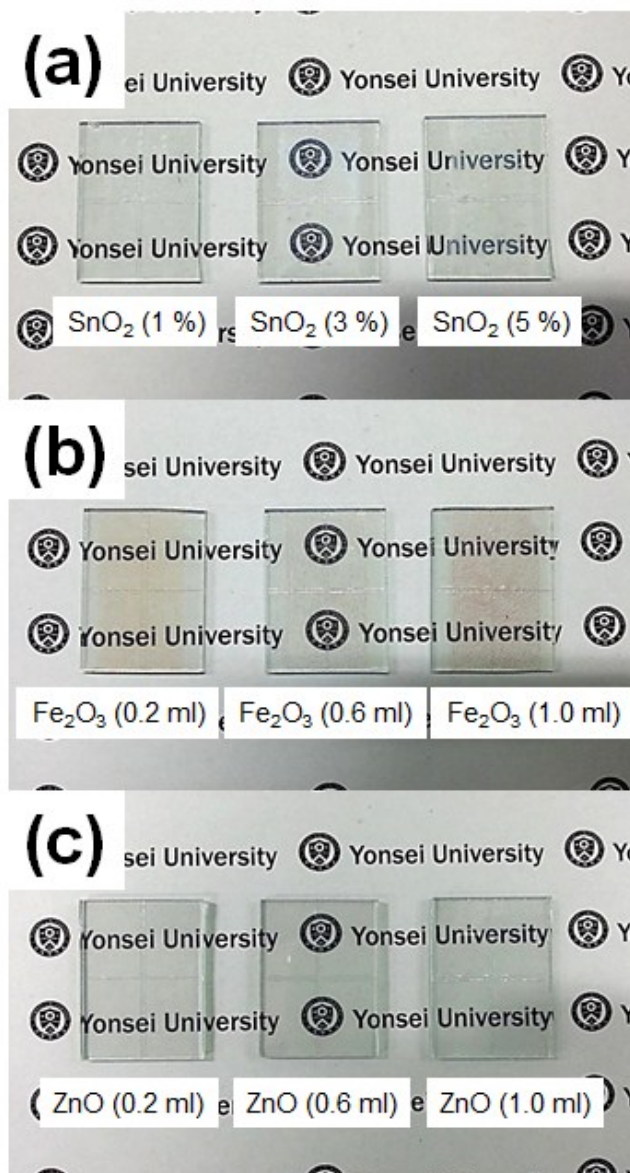
**Fig. S8** FE-SEM images of mesoporous  $\text{Fe}_2\text{O}_3$  prepared using constant PVA-PMMA concentration and different volumes of precursor solution at low and high magnifications: (a, b) 0.2 ml, (c, d) 0.6 ml, and (e, f) 1.0 ml.



**Fig. S9** FE-SEM images of mesoporous ZnO prepared using a constant PVA-PMMA concentration and different volumes of precursor solution at low and high magnifications: (a, b) 0.2 ml, (c, d) 0.6 ml, and (e, f) 1.0 ml.



**Fig. S10** Photographs of mesoporous metal oxide films: (a)  $\text{SnO}_2$ , (b)  $\text{Fe}_2\text{O}_3$ , and (c)  $\text{ZnO}$ .



**Table S1.** Characteristic FT-IR absorption bands for PVA-PMMA/metal precursor hybrids.

Metal precursor	Wavenumber			
	(bond)			
Ti	1636	990	938	
	(Ti-OH)	(Ti-O)	(Ti-OH)	
Si	1060	952		
	(Si-O-Si)	(Si-OH)		
Al	1007	957	544	
	(Al-O)	(Al-OH)	(Al-OH)	
Zr	1647	1555	995	631
	(Zr-OH)	(Zr-O-C)	(Zr-O)	(Zr-O-Zr)
Sn	1035	987	904	
	(Sn-OH)	(Sn-O-Sn)	(Sn-O-Sn)	
Fe	930			
	(Fe-OH)			
Zn	2847	1066, 1023	890	659–544
	(C-H of TEA)	(C-N of TEA)	(Zn-OH)	(Zn-O)