Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

for

Reproducible Shape Control of Single-Crystal SnO Micro Particles

*Mai Thanh Nguyen, Hiroaki Shirai, Chondanai Tiankanon, Hiroki Tsukamoto, Yohei Ishida and Tetsu Yonezawa**

Division of Materials Science and Engineering, Faculty of Engineering, Hokkaido University, Kita 13 Nishi 8, Sapporo, Hokkaido 060-8628, Japan

Corresponding author. Email: tetsu@eng.hokudai.ac.jp

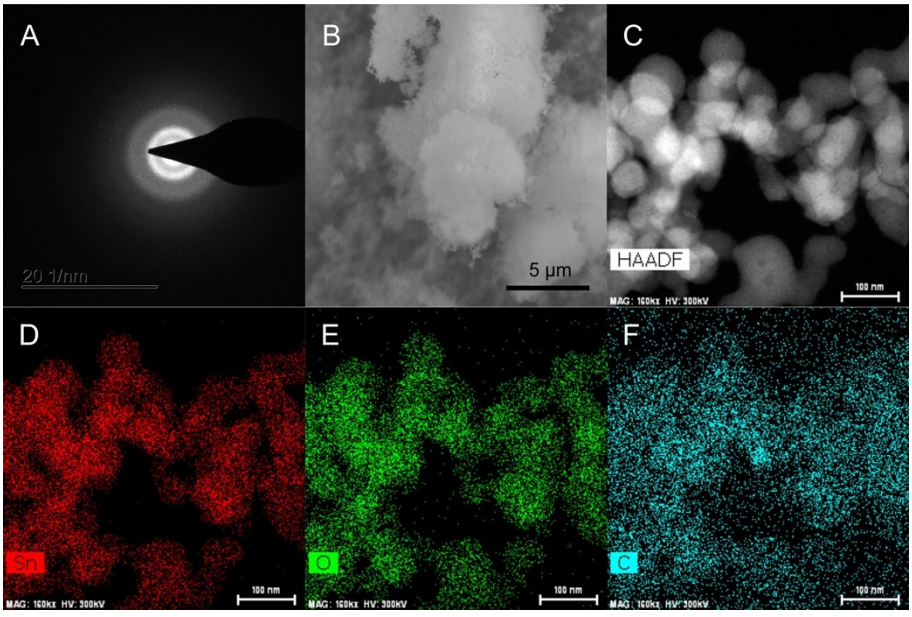

Figure S1. (A) SAED pattern, (B) SEM image, (c) HAADF image and (D-F) EDX elemental mappings for Sn L, O K, and C K of the particles synthesized using only OD at 200 °C.

Table S1. Crystallite size and strain estimation for SnO particles from the XRD peak broadening

OAM vol%	Crystallite size (nm)	Strain (%)
100	128	0.30
75	120	0.25
50	134	0.25
36	141	0.25
30	133	0.24
25	116	0.19
20	56	0.35
9	59	0.41
1	47	0.44

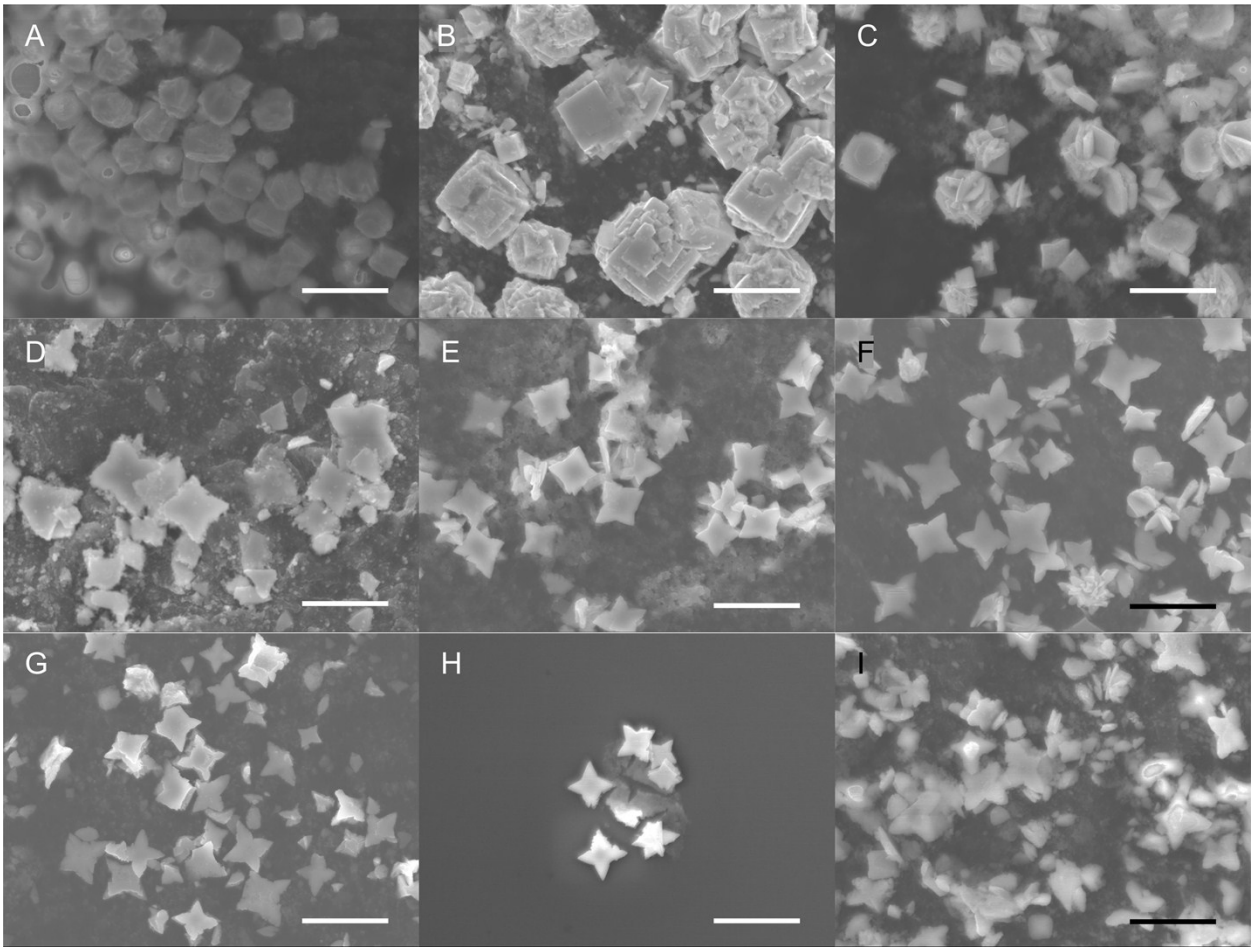

Figure S2. (A-I) SEM images of the SnO particles obtained using OAM in concentrations of 1, 9, 20, 25, 30, 36, 50, 75, and 100 vol%, respectively. All the scale bars represent 5 μm.

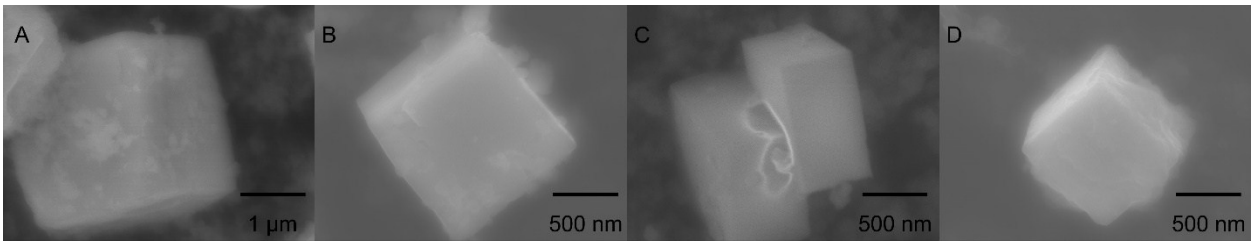

Figure S3. SEM images of SnO particles synthesized using 9 vol% OAM and same total reaction volume, and in different input amounts of $Sn(acac)_2$: (A) 0.76, (B, C) 0.38, and (D) 0.19 mmol. The input amount of $Sn(acac)_2$ of 1.52 mmol is used in the standard case shown in the main text.

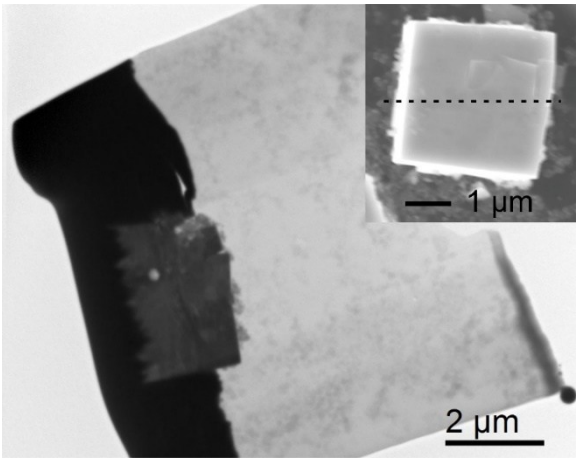

Figure S4. Cross sectional TEM image of SnO particles synthesized using 9 vol% OAM after FIB processing along the top-down direction: SnO is sandwiched between the carbon tape (grey) and the W coating layer (black); the inset shows the top view image of the cubic particle before W deposition, and the FIB cutting is along the dash line.

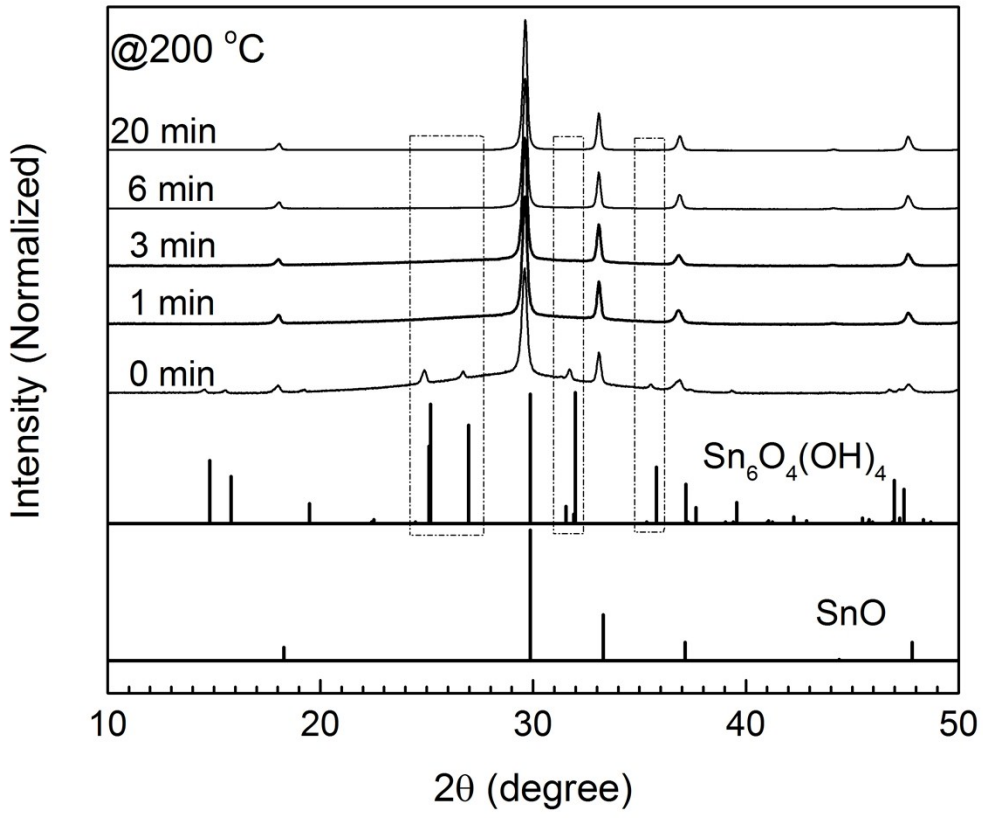

Figure S5. XRD patterns of the obtained particles synthesized using 36 vol% OAM at 200 °C after various reaction time: 0, 1, 3, 6, and 20 min. Reference patterns for tetragonal SnO (PDF No. 06-0395) and tetragonal $Sn_6O_4(OH)_4$ (PDF No. 046-1486) are given. The dashed rectangular windows are used for visual guide of some areas in the patterns distinguishable for only $Sn_6O_4(OH)_4$ peaks.

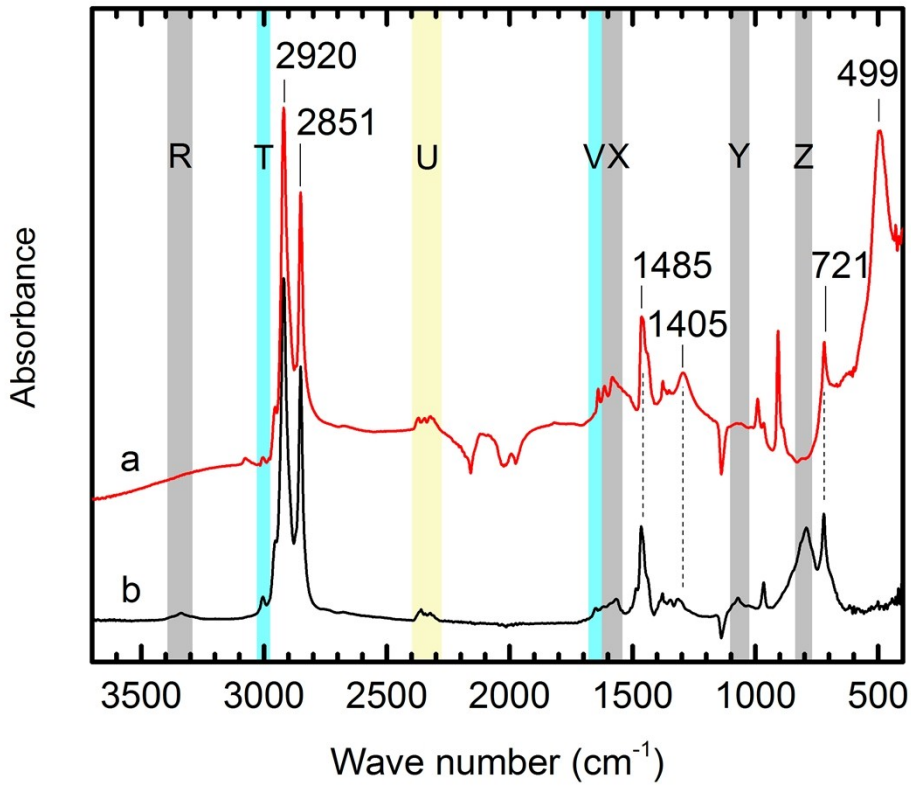

Figure S6. FT-IR spectrum of (a) purified SnO particles synthesized using 36 vol% OAM and (b) only OAM. The assignment of peaks and bands is given in Table S2.

Table S2. Infrared vibrational assignment for the FT-IR spectra in Figure S6

Peak/band ID	**Frequency**	**Vibrational mode**	**SnO-OAM**	**Only OAM**
	2920 and 2851	ν_{as}(C-H) and ν_s(C-H)	strong, sharp	strong, sharp
	1485-1405	δ(-CH_3)	medium	strong-weak
	721	δ(C-C)	medium	medium
	499	ν(Sn-O)	strong	none
R	3300-3360	ν_{as}(NH_2) and ν_s(NH_2)	very weak	weak
X Z	1550-1620 790-810	δ(NH_2) δ(NH_2)	medium weak	medium strong
Y	1060-1090	δ(C-N) in amine	weak	medium
T	3003-3006	ν(=C-H)	weak	medium
V	1640-1660	ν(-C=C-)	medium	medium
U*	2320-2400	ν(O=C=O)	From the environment	

ν, ν_{as}, ν_s, δ are stretching, as-symmetric stretching, symmetric stretching and bending vibrations, respectively.
The peaks located between Y and Z bands may belong to the stretching vibration of trans-(-CH=). A band at 1000 cm-1 is an un-assigned band, this presents in FT-IR spectra of all SnO samples.

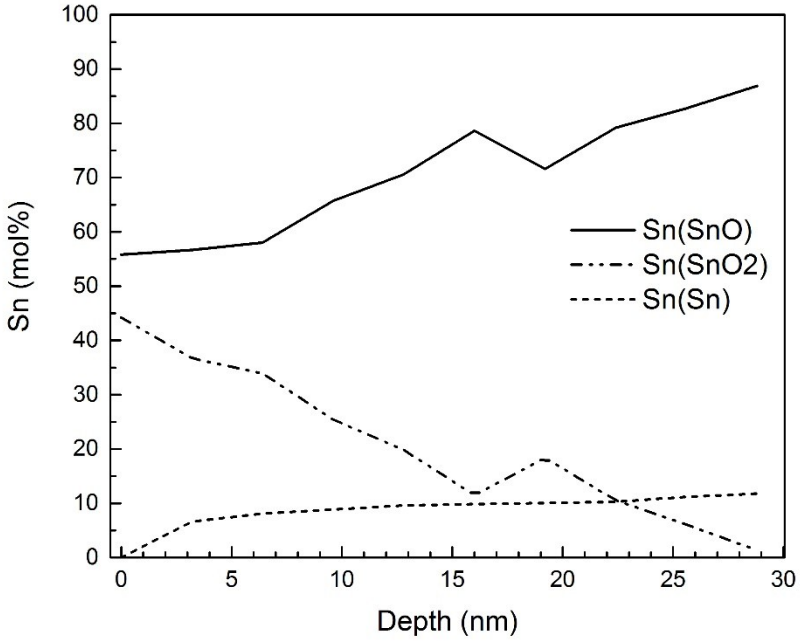

Figure S7. AES depth profile of SnO particles synthesized using 30 vol% OAM. Depth profile was collected using Ar etching with etching rate of 3.2 nm/min. The mol% of Sn in SnO, SnO_2, and metallic Sn were plotted using solid, dashed, and dash-dot-dot curves, respectively.

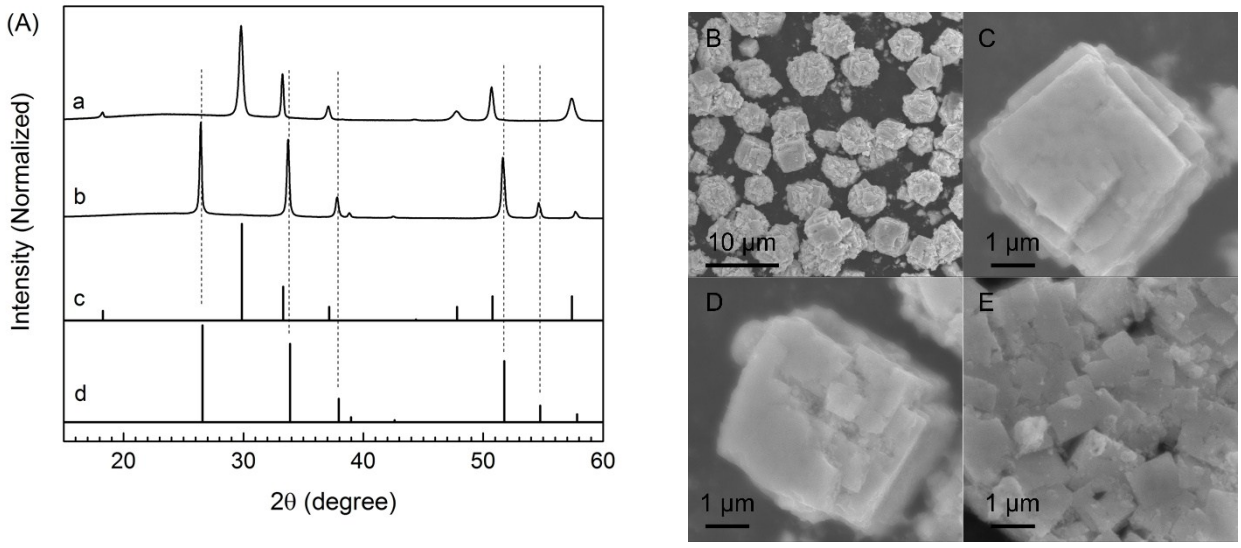

Figure S8. (A) XRD patterns of (a) the as-synthesized SnO particles using 9 vol% OAM, (b) resulting samples after annealing in the air at 700 °C for 2 h, and reference patterns for (c) tetragonal SnO (PDF No. 06-0395), and (d) tetragonal SnO_2 (PDF No. 021-1250) respectively. (B-D) Corresponding SEM images of the annealed particles. The dash lines, which marked some main peak positions of tetragonal SnO_2 were used to guide the eyes.

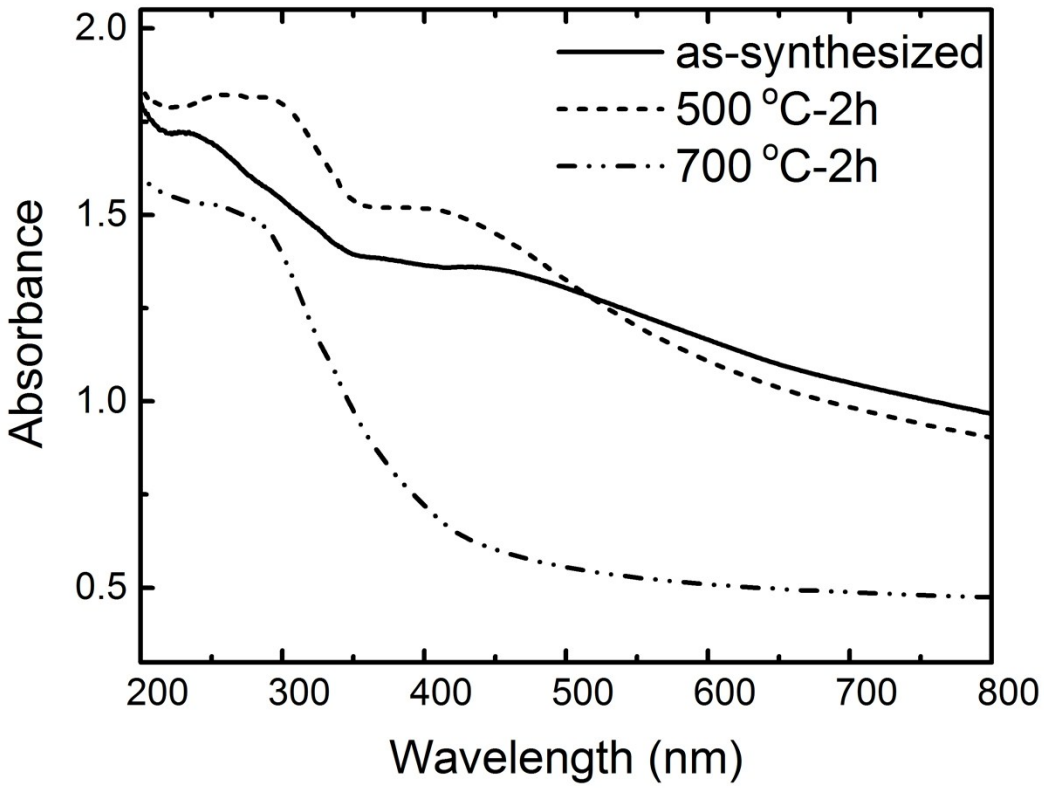

Figure S9. Absorption spectrum of the SnO particles synthesized using 75 vol% OAM at room temperature (solid curve) and those obtained after annealing at 500 °C (dash curve) and 700 °C for 2 h (dash-dot-dot curve).