Supporting Information

An Efficient Particulate Photocatalyst for Overall Water Splitting Based on Scandium and Magnesium Co-Doped Strontium Titanate

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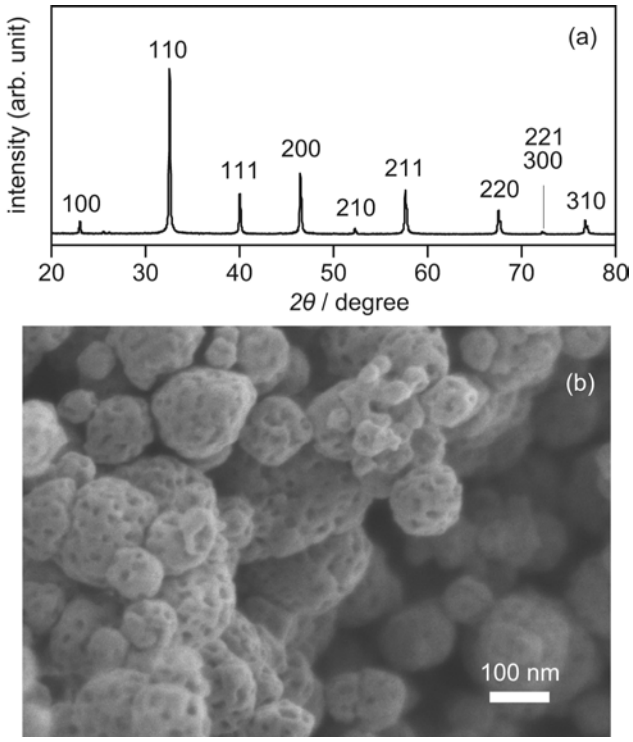

Fig. S1 (a) an XRD pattern and an SEM image of the commercial $SrTiO_3$ powder supplied from FUJIFILM Wako.

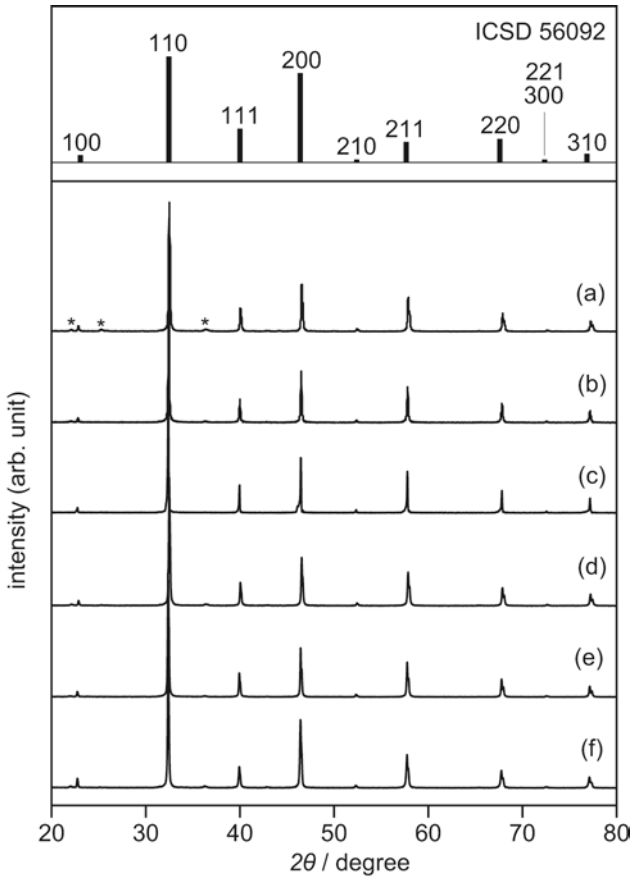

Fig. S2 XRD patterns of (a) $SrTiO_3$:Al, (b) $SrTiO_3$:Sc, (c) $SrTiO_3$:Mg, (d) $SrTiO_3$:Al,Sc, (e) $SrTiO_3$:Al,Mg, and (f) $SrTiO_3$:Sc,Mg samples. An XRD profile of $SrTiO_3$ (ICSD 56092) obtained by VESTA software[1] was also shown as a reference. Asterisks (*) denote reflections of $SrCO_3$ derived from the $SrCl_2$ flux.

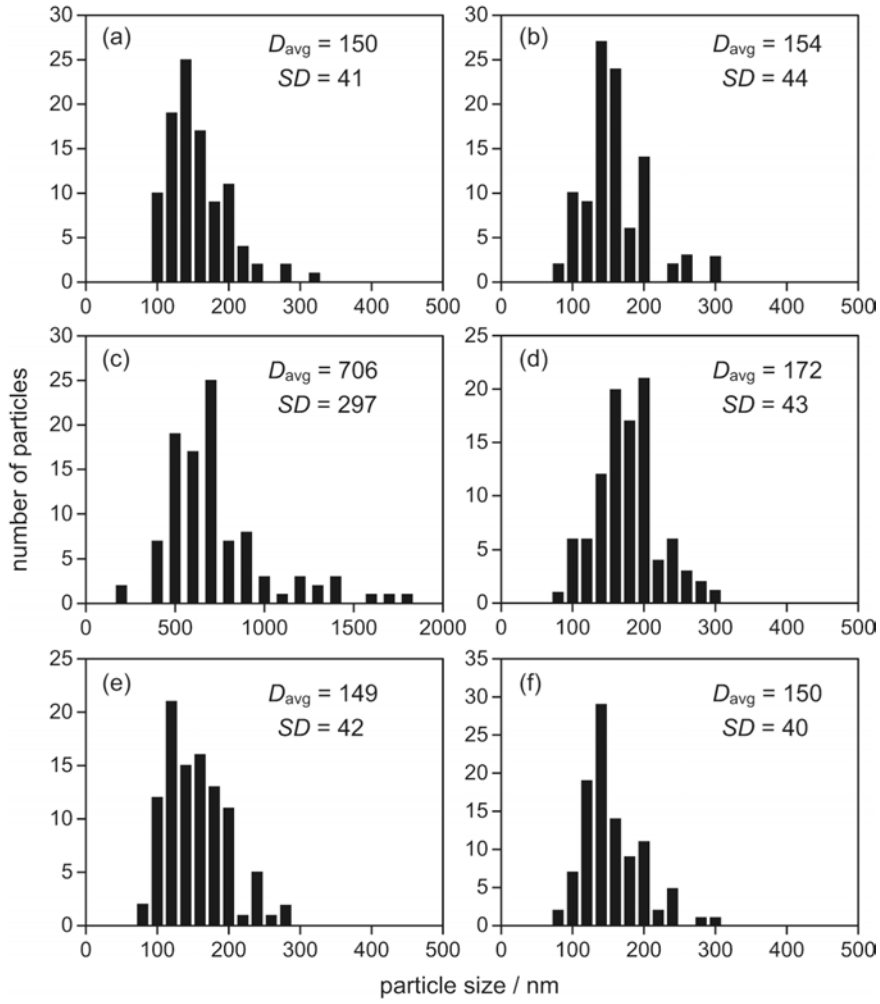

Fig. S3 Particle-size distributions of (a) $SrTiO_3$:Al, (b) $SrTiO_3$:Sc, (c) $SrTiO_3$:Mg, (d) $SrTiO_3$:Al,Sc, (e) $SrTiO_3$:Al,Mg, and (f) $SrTiO_3$:Sc,Mg samples. Insets of these plots indicate average diameters (D_{avg}s) and their standard deviations (*SD*s) in a nanometer unit.

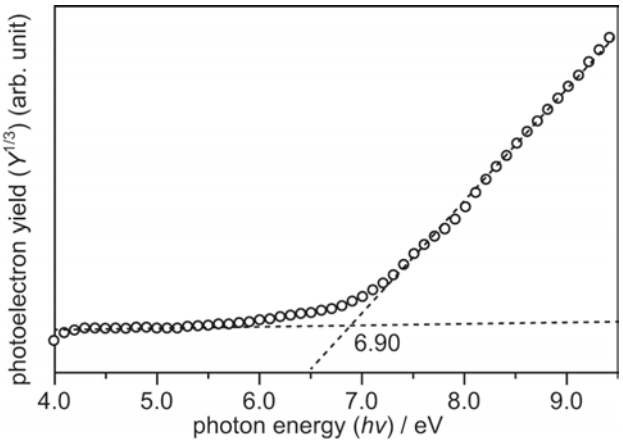

Fig. S4 A photoemission yield ($Y^{1/3}$)-energy ($h\nu$) plot of the $SrTiO_3$:Sc,Mg sample.

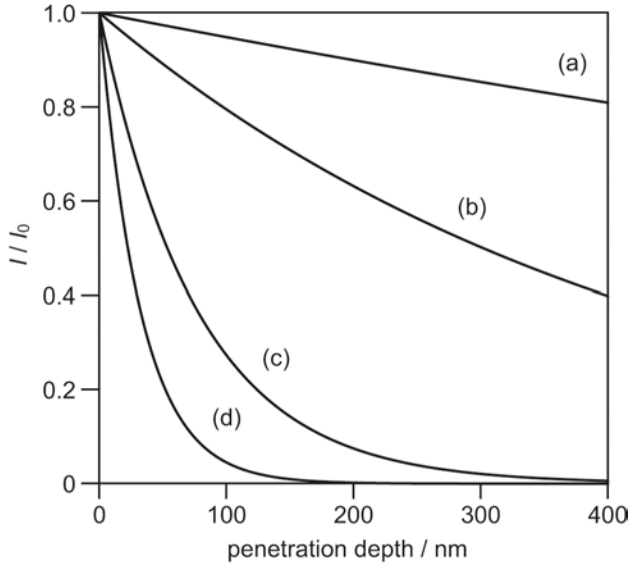

Fig. S5 Transmittance depth profiles of an $SrTiO_3$ bulk crystal at various photon energies obtained from photoabsorption coefficients (αs) reported by Zollner et al.[2] (a) 3.2 eV (365 nm), (b) 3.4 eV (344 nm), (c) 3.8 eV (326 nm), and (d) 4.0 eV (310 nm).

Table S1 Ratios of intensities of the photoabsorption at 10,000 cm^{-1} measured in O_2 and H_2O after a 100-μs delay relative to that measured in N_2

Sample	I_{O2}/I_{N2} [a)]	I_{O2}/I_{H2O} [b)]
$SrTiO_3$:Sc,Mg	0.76	1.76
$SrTiO_3$:Al	0.81	1.36

[a)] Ratio of the photoabsorption intensity at 10,000 cm^{-1} measured in O_2 after the 100 μs delay relative to that measured in N_2.

[b)] Ratio of the photoabsorption intensity at 10,000 cm^{-1} measured in H_2O after the 100 μs delay relative to that measured in N_2.

References

1 K. Momma, F. Izumi, *J. Appl. Crystallogr.* 2011, **44**, 1272.

2 S. Zollner, A. A. Demkov, R. Liu, P. L. Fejes, R. B. Gregory, P. Alluri, *J. Vac. Sci. Technol. B* 2000, **18**, 2242.