

Supporting Information

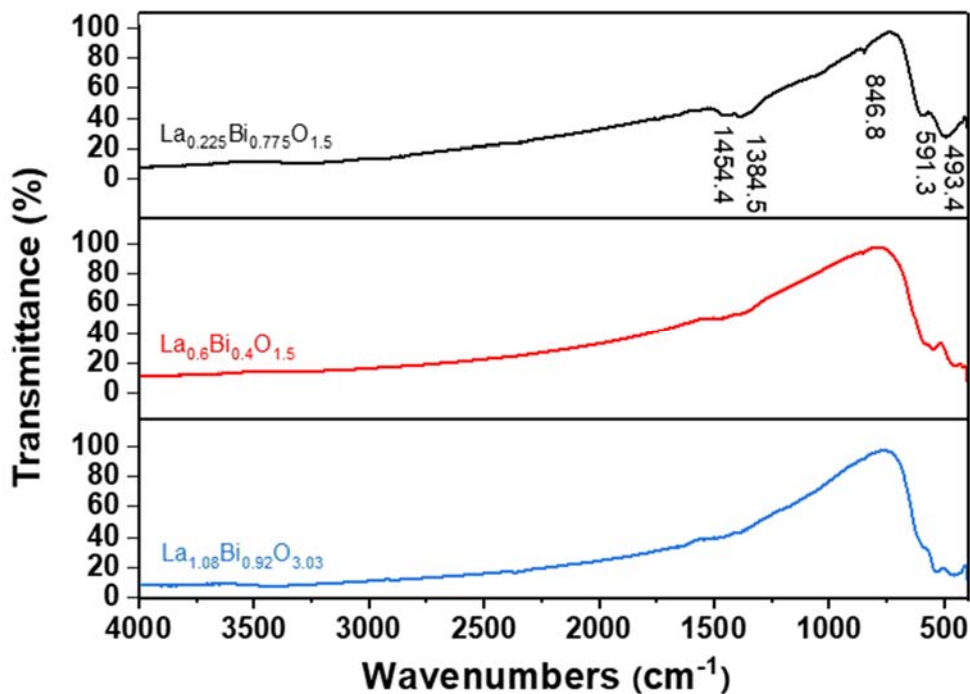


Fig. S1. FT-IR spectra of the $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ samples.

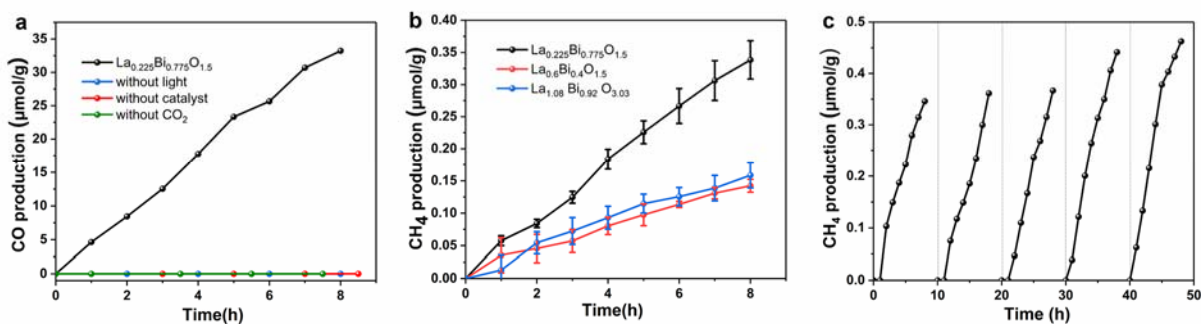


Fig. S2. (a) Products detected in three blank reactions of $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$. (b) Product yields of CH_4 over $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ and (c) stability test of CH_4 performed in five cycles over $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$.

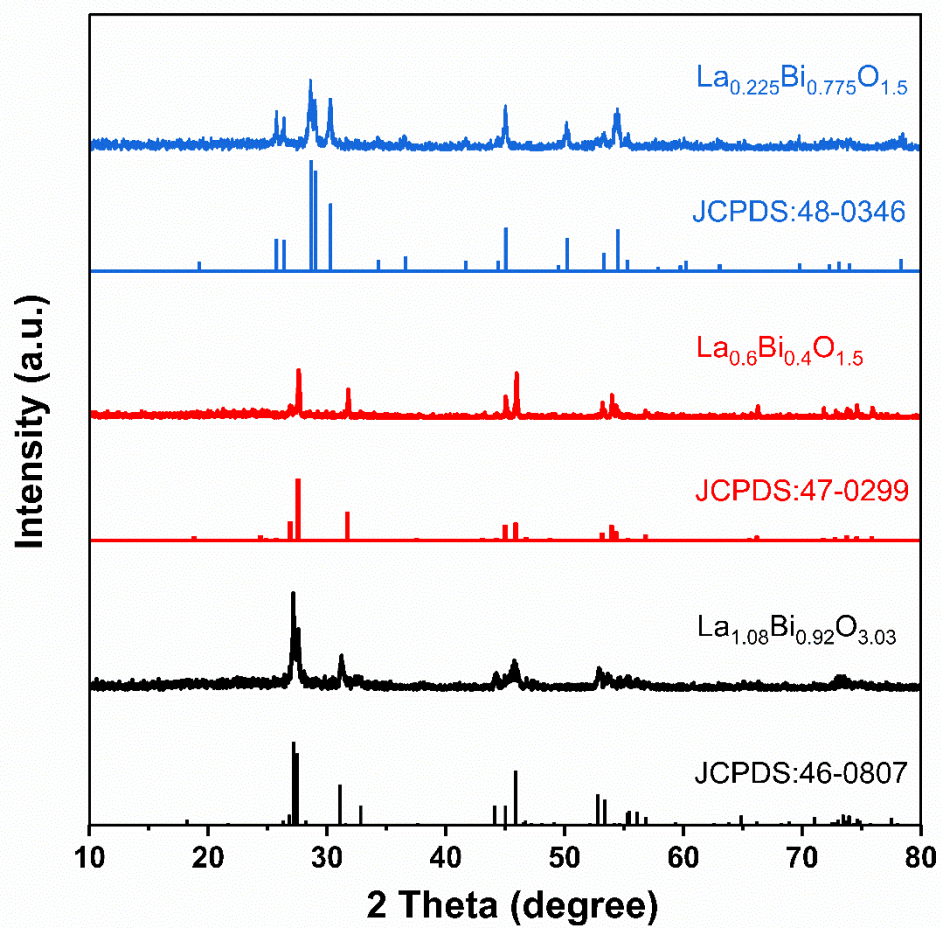


Fig. S3. XRD patterns of $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ after the photocatalytic reduction process.

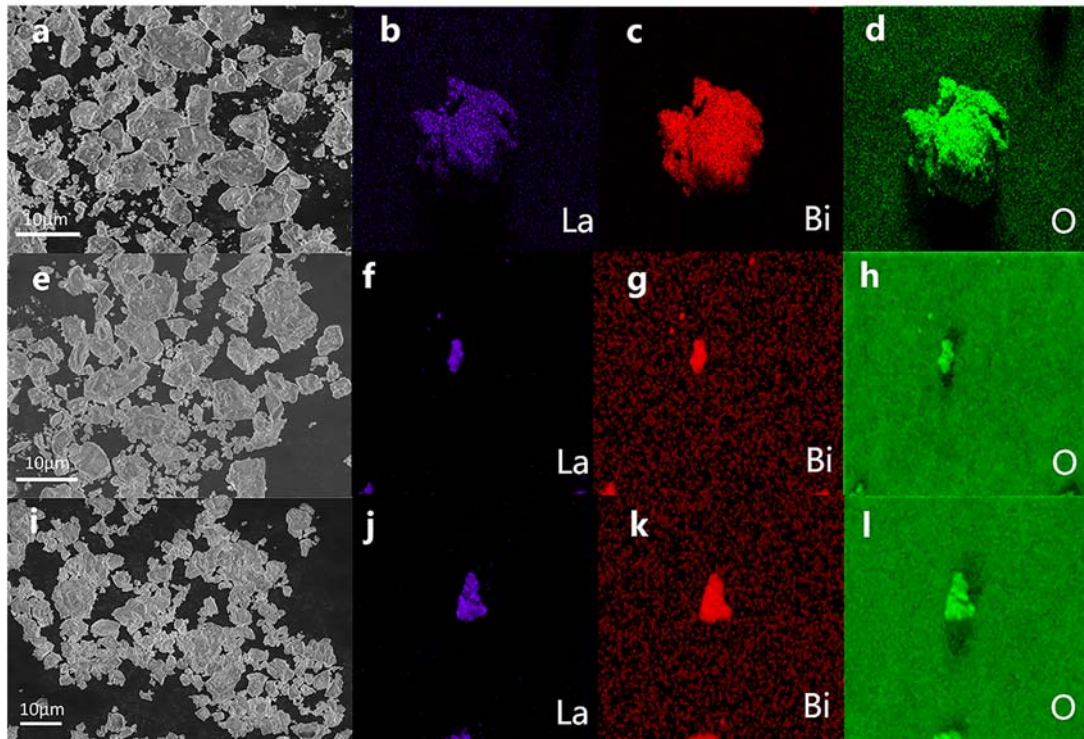


Figure S4. SEM images of (a) $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, (e) $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and (i) $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ and EDX elemental mapping images of (b, c, d) $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, (f, g, h) $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, (j, k, l) and $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ before the photocatalytic reduction process. Images (a), (e), and (i) are the same images as those in Figs. 5(a), 5(b), and 5(c), respectively.

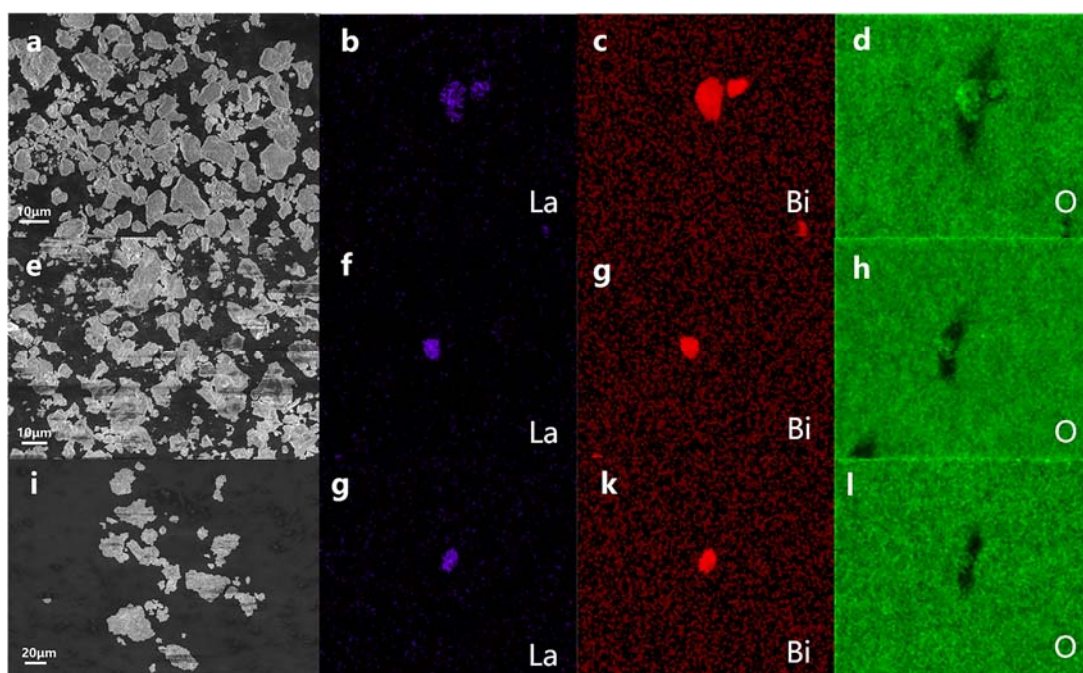


Fig. S5. (a) SEM images of $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, (e) $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and (f) $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ after the photocatalytic reduction process. EDX elemental mapping images of (b, c, d) $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, (f, g, h) $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and (g, k, l) $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ after the photocatalytic reduction process.

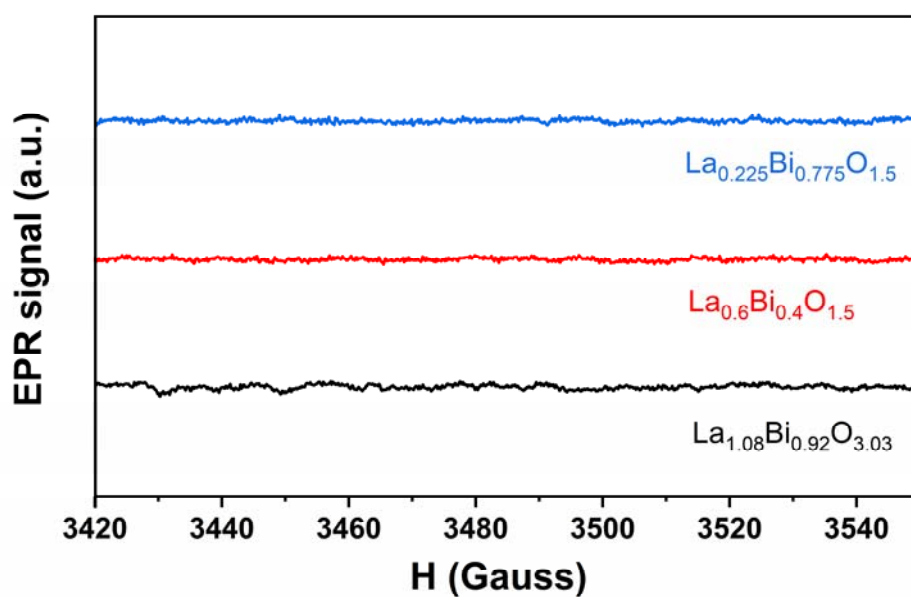


Fig. S6. EPR spectra of the $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ samples.

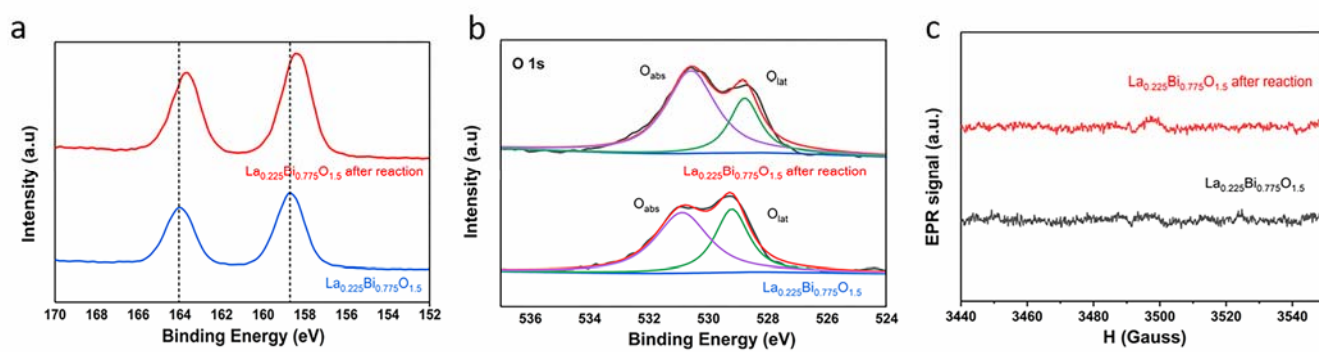


Fig. S7. (a) Bi 4f and (b) O 1s XPS spectra and (c) EPR spectra of $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$ before and after the photocatalytic reduction process.

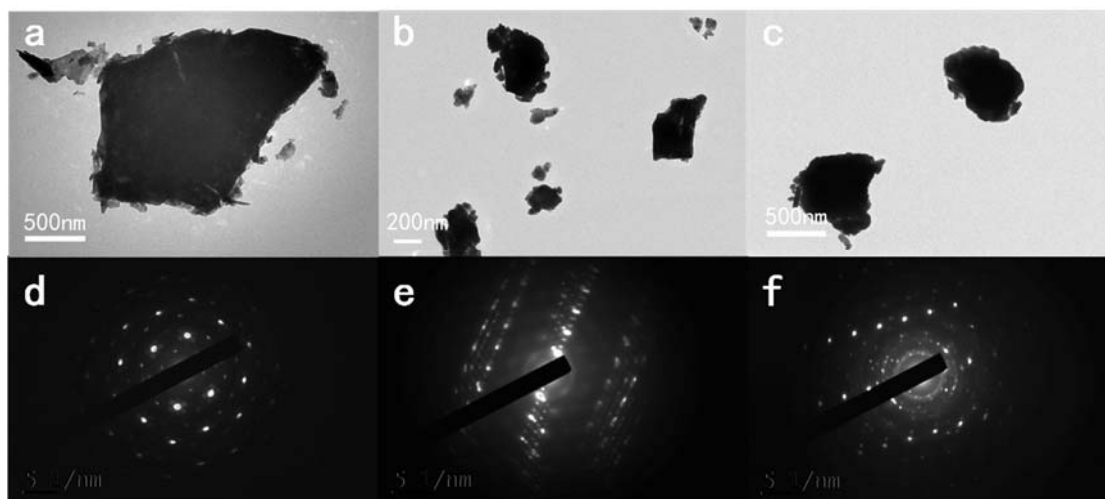


Fig. S8. TEM images of (a) $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, (b) $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and (c) $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$ samples and SAED patterns of (d) $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, (e) $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and (f) $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$.

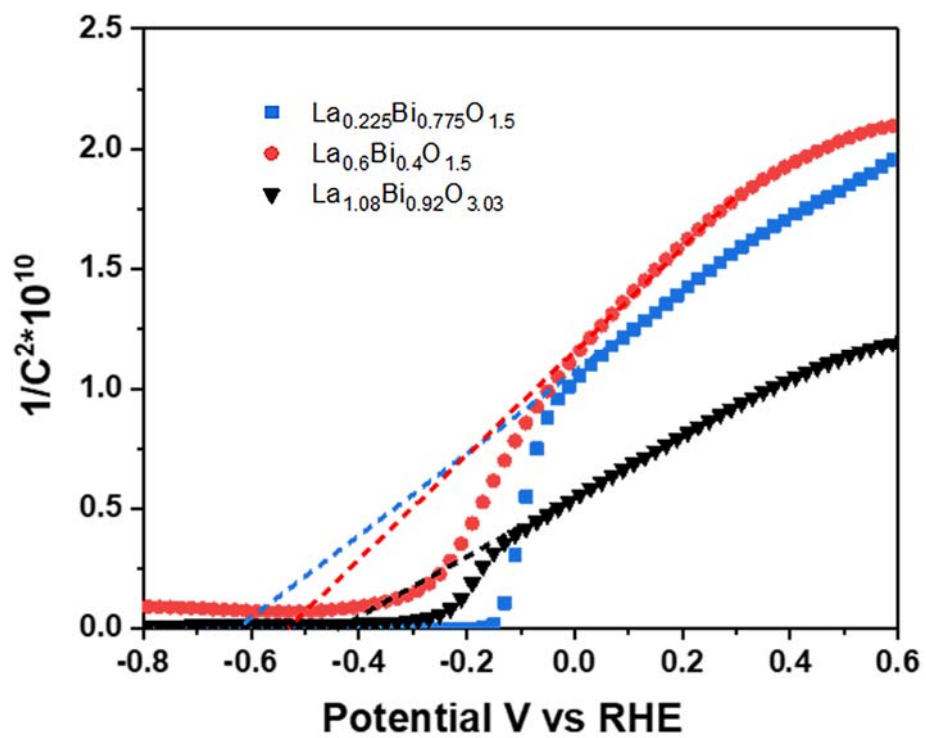


Fig. S9. Mott-Schottky plots of $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$.

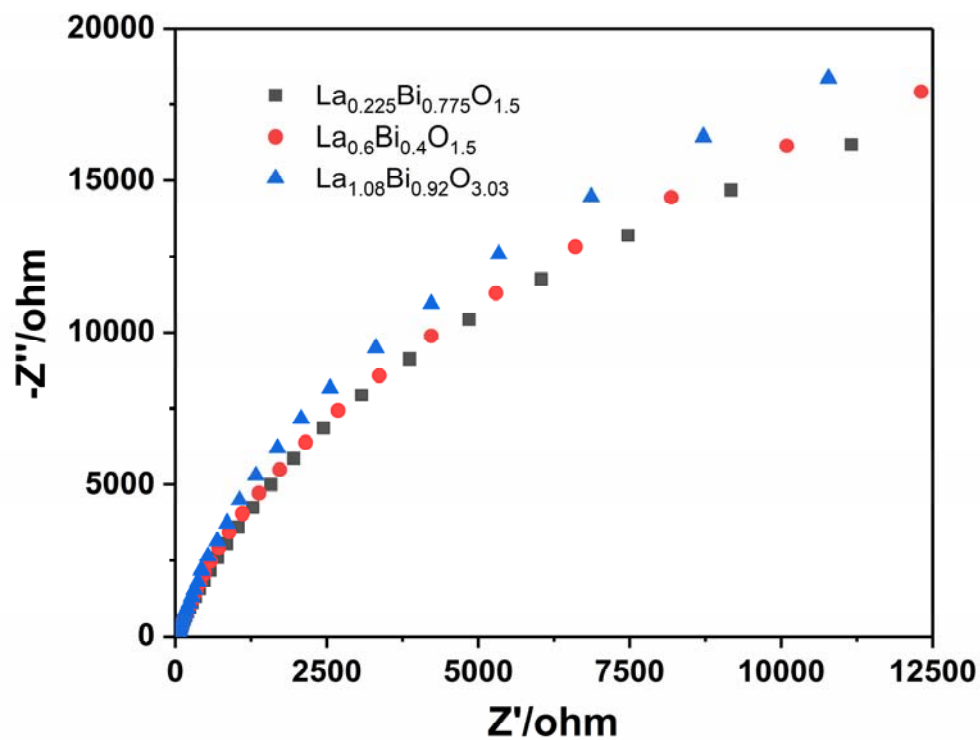


Fig. S10. Electrochemical impedance spectra of $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$, $\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$, and $\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$.

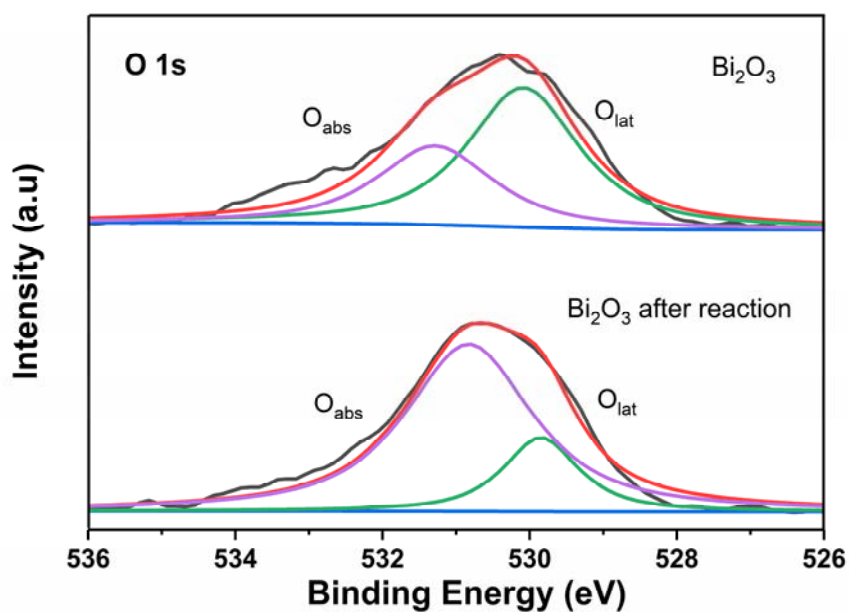


Fig. S11 O1s XPS spectra of Bi_2O_3 before and after the photocatalytic reduction process.

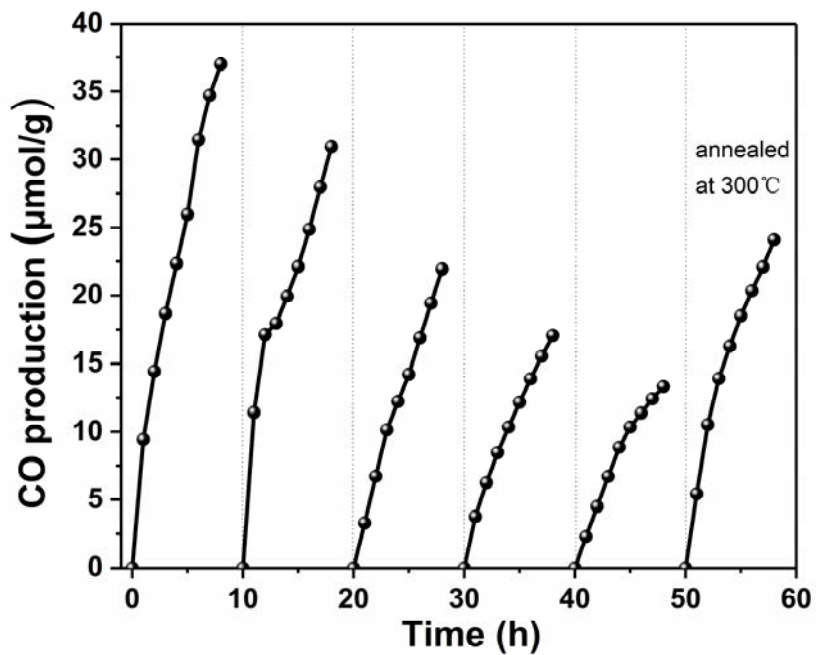


Fig. S12 Product yields of CO over $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$ in five cycles and after annealing at 300 °C.

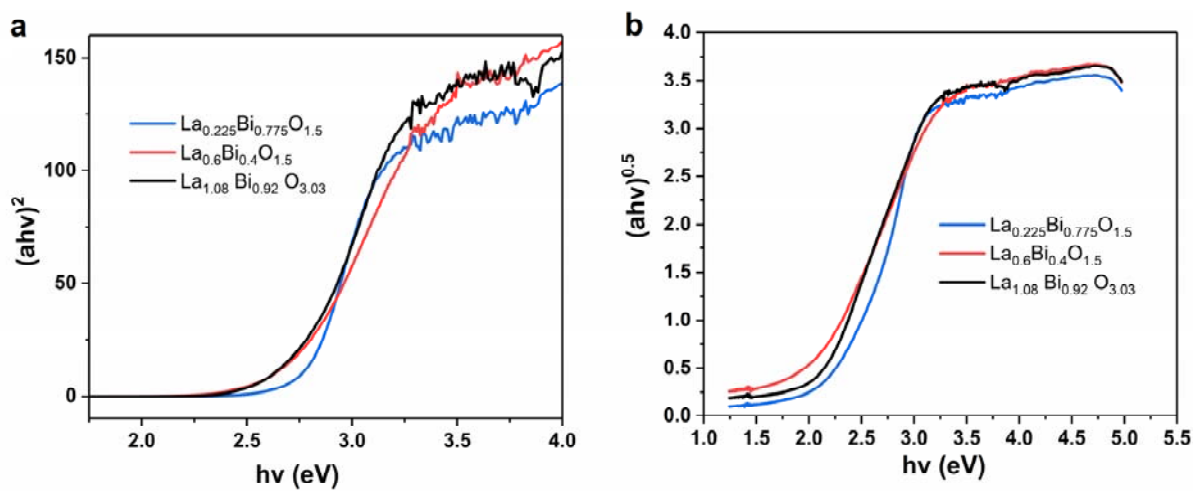
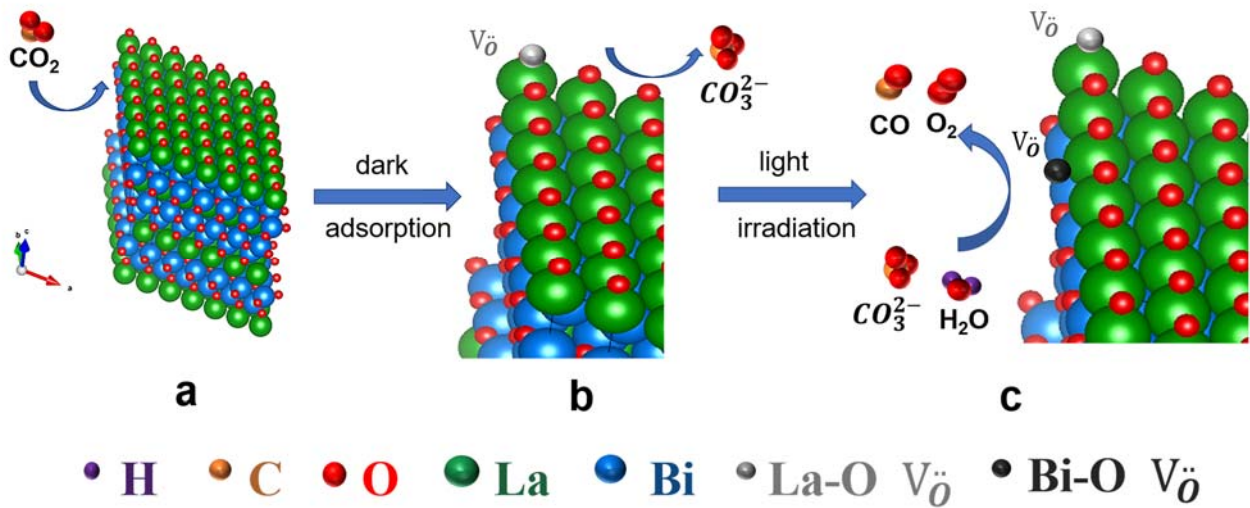


Fig. S13 Relationship between $(ahv)^n$ and $h\nu$ when (a) $n=2$ and (b) $n=0.5$.



Scheme S1. (a, b) Adsorption process under dark conditions and (c) the lattice oxygen of $\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$ involved in photocatalytic reduction under light irradiation.

Table S1. Fluorescence emission decay parameters of these La-Bi-O samples

Sample	τ_1 (μs)	I_1 (%)	τ_2 (μs)	I_2 (%)	τ_3 (μs)	I_3 (%)	Ave. τ (μs)
$\text{La}_{0.225}\text{Bi}_{0.775}\text{O}_{1.5}$	0.88	51.45	12.1	12.43	129	36.12	48.4
$\text{La}_{0.6}\text{Bi}_{0.4}\text{O}_{1.5}$	0.88	67.76	11.4	12.53	112	19.71	24.2
$\text{La}_{1.08}\text{Bi}_{0.92}\text{O}_{3.03}$	0.96	59.39	13.6	18.52	117	22.10	29.0