Supplementary Information

Remarkable enhancement of the photocatalytic performance in $LaCrO_3$ through controlled chemical reduction process.

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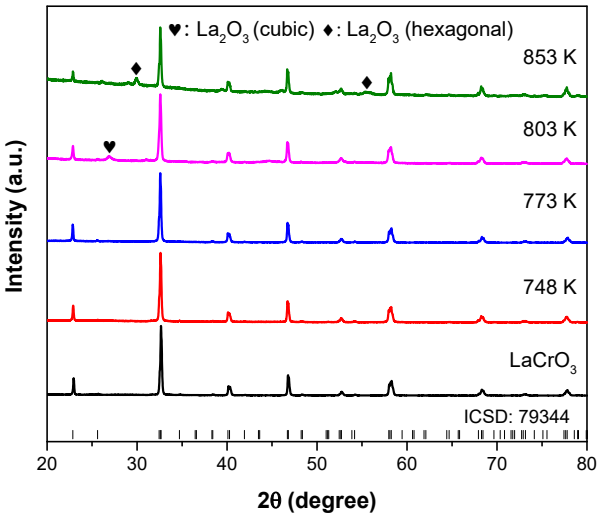
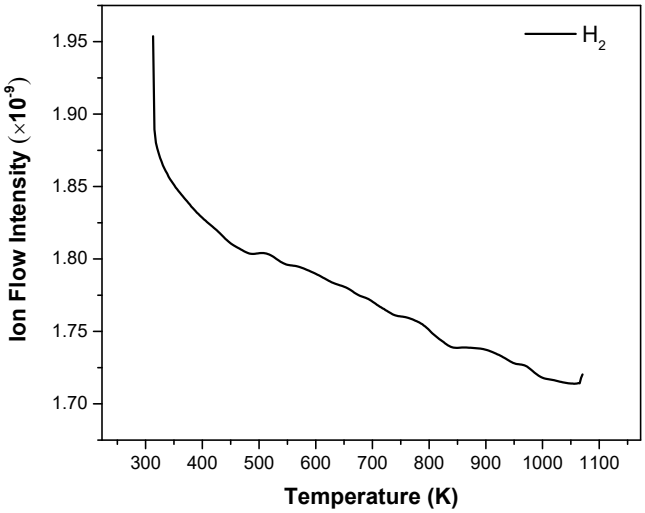
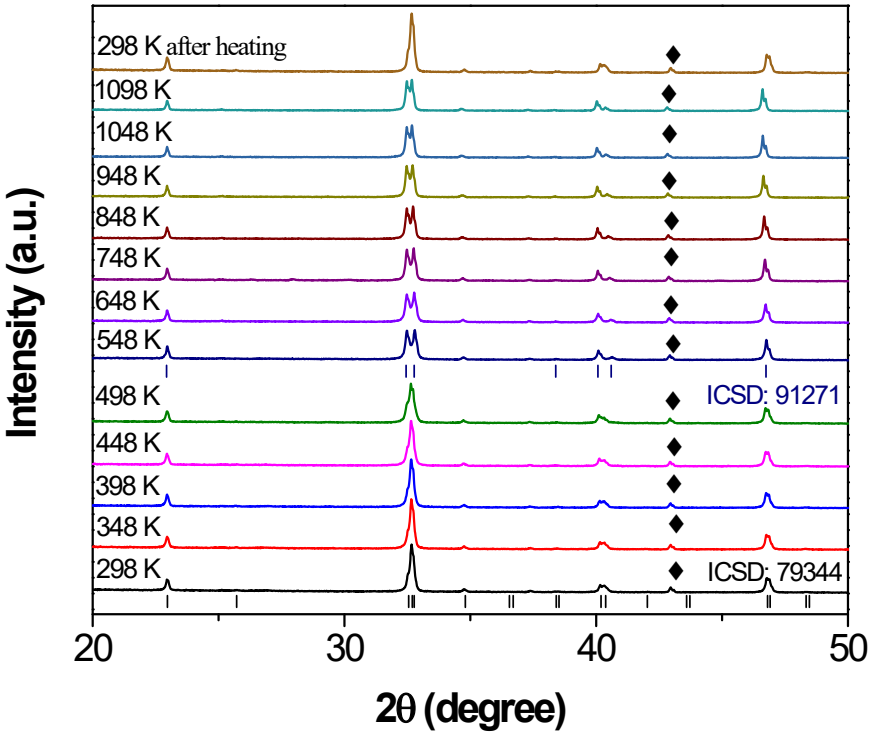


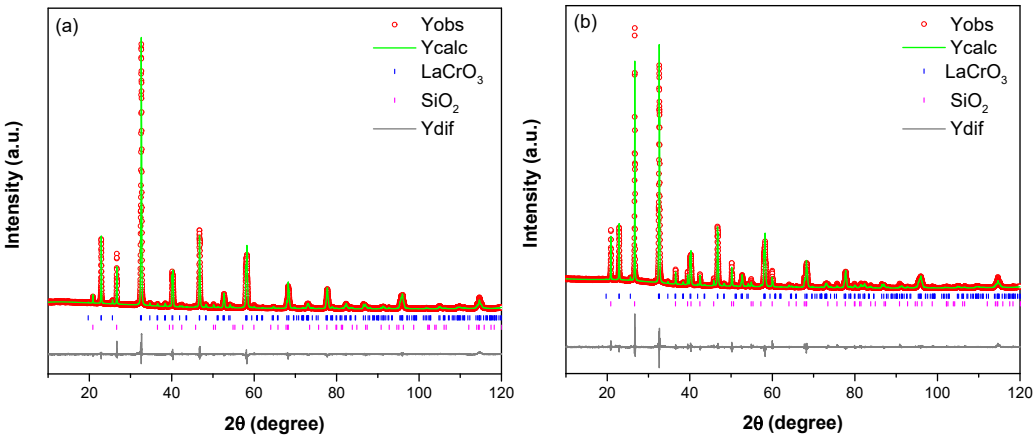
Supplementary Figure 1. Laboratory XRD data recorded for $LaCrO_3$ reduced at different temperatures but with a fix 1:3 $LaCrO_3$:CaH_2 molar ratio for three days. The bragg peaks placed at the bottom of the figure refer to the orthorhombic phase of $LaCrO_3$. The heart and diamond symbols refer to La_2O_3 (cubic phase) and La_2O_3 (hexagonal polymorph), respectively.



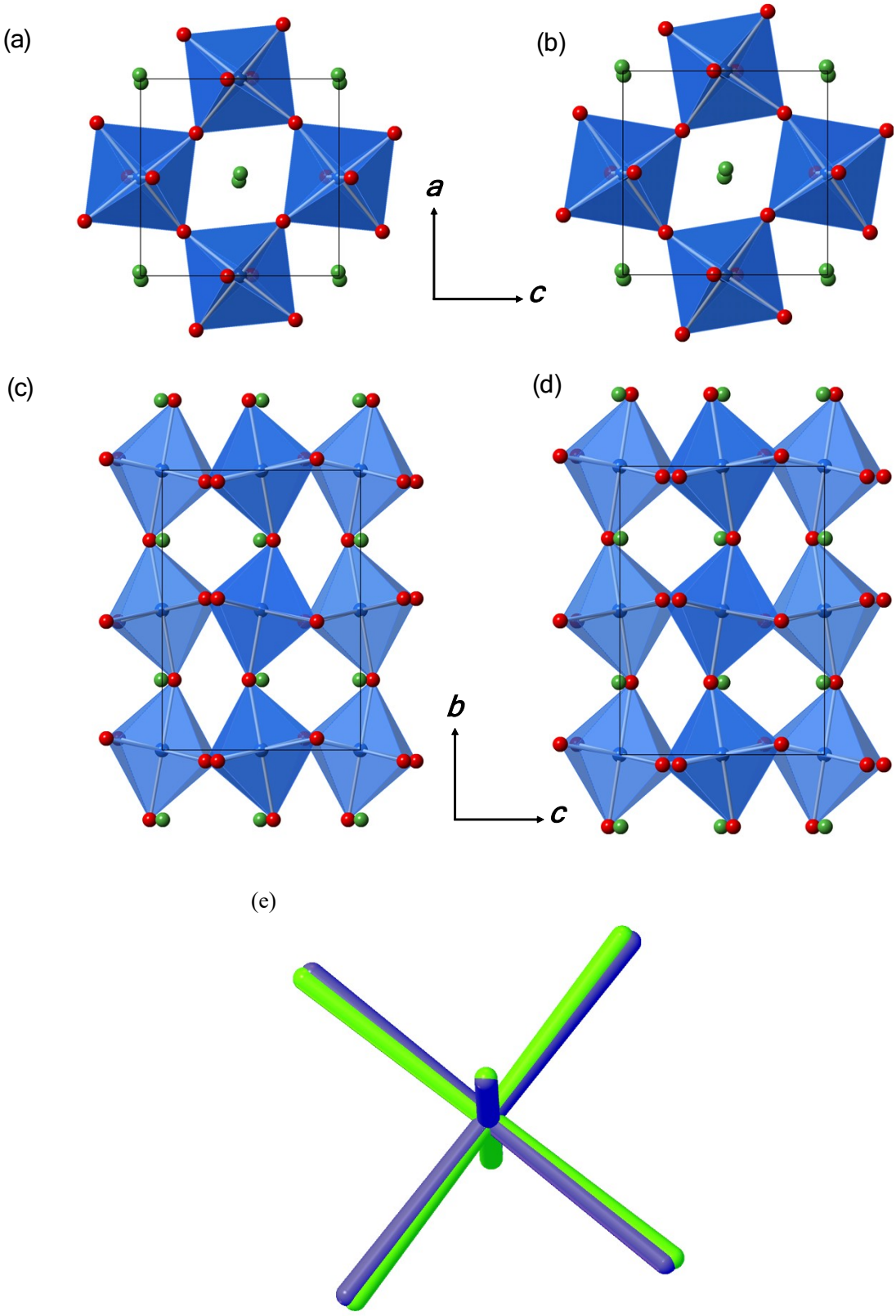
Supplementary Figure 2. Mass-spectrometry of H_2 gas species during heating of $LaCrO_{3-\delta}$ under flowing Ar.



Supplementary Figure 3. VTXRD data recorded for $LaCrO_{3-\delta}$ (reduced at 773 K) for three days. Diamond marks indicate the presence of Al_2O_3 arising from the sample holder.



Supplementary Figure 4. Rietveld plots of XRD data of $LaCrO_3$ (a) and $LaCrO_{3-\delta}$ (b). The reliability factors are $R_{wp} \sim 6.69\%$, $R_p \sim 3.66\%$, GOF ~ 1.83 (a), and $R_{wp} \sim 7.49\%$, $R_p \sim 3.38\%$, GOF ~ 2.22 (b). The pink and blue Bragg peaks denote SiO_2 and $LaCrO_3$ (orthorhombic) phases.



Supplementary Figure 5. View of the refined structure of $LaCrO_3$ (a and c) and $LaCrO_{3-\delta}$ (b and d). (e) Structural overlay of CrO_6 octahedron in the sticks and wireframe mode. The blue and green ones stand for octahedra in the parent and reduced $LaCrO_3$.