# Supporting Information

## $CeO_2$ facets control: from single (100) to multiple

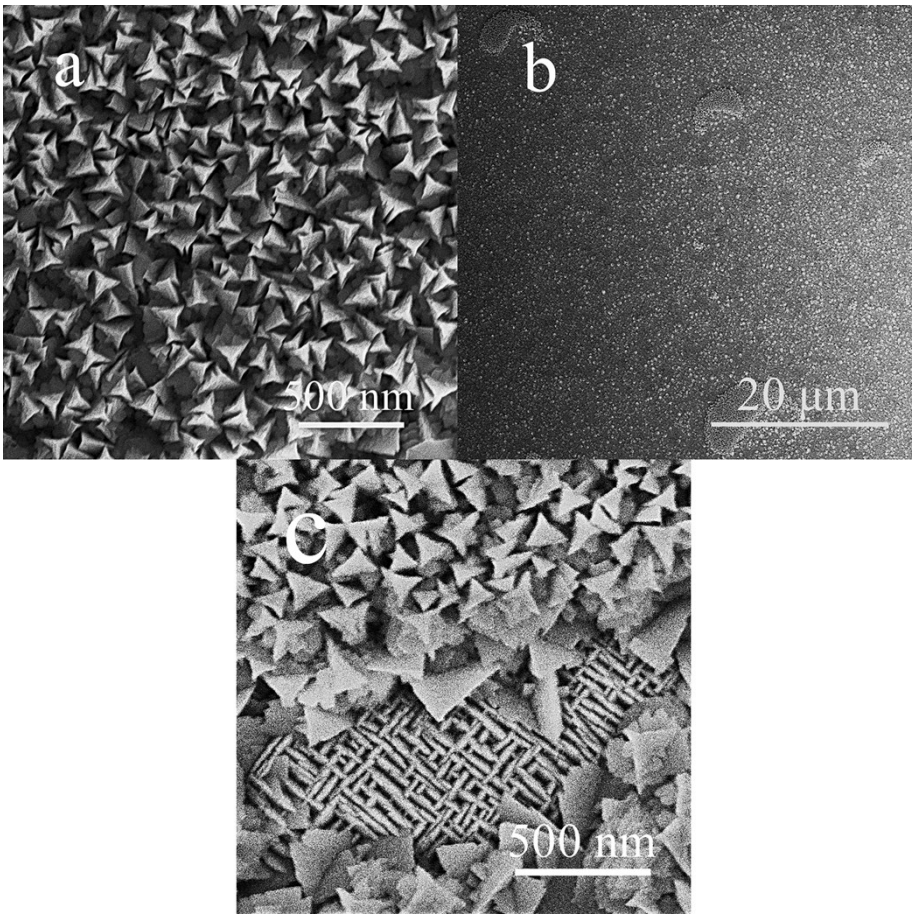


**Figure S1**. (a) SEM images of star-like nanosheets mentioned in Figure 2d. (b, c) SEM images of $S_{50}$.

Figure S1 shows the SEM images of $S_{50}$. From figure S1(c) it can be seen that the star-like nanosheets were grown on the top of the triangle-like nanosheets. No star-like nanosheets existed on the top of the nanorods. It can be further demonstrated that the (111) facet of $CeO_2$ grown on the top of (110) facet, not the (100) facet or the substrate.

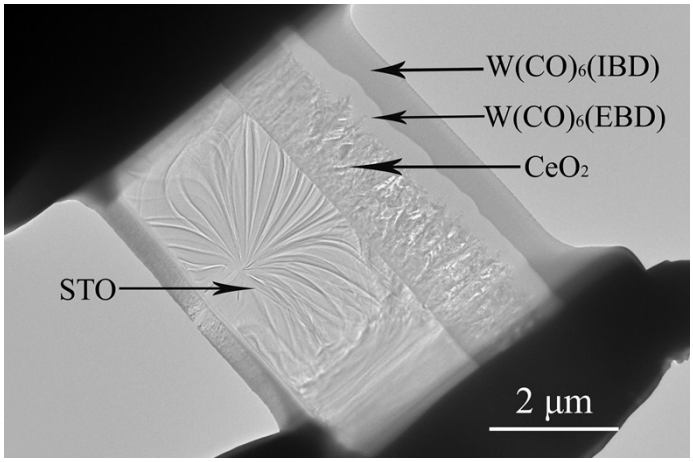


**Figure S2**. SEM images of cross-section of $S_{50}$.

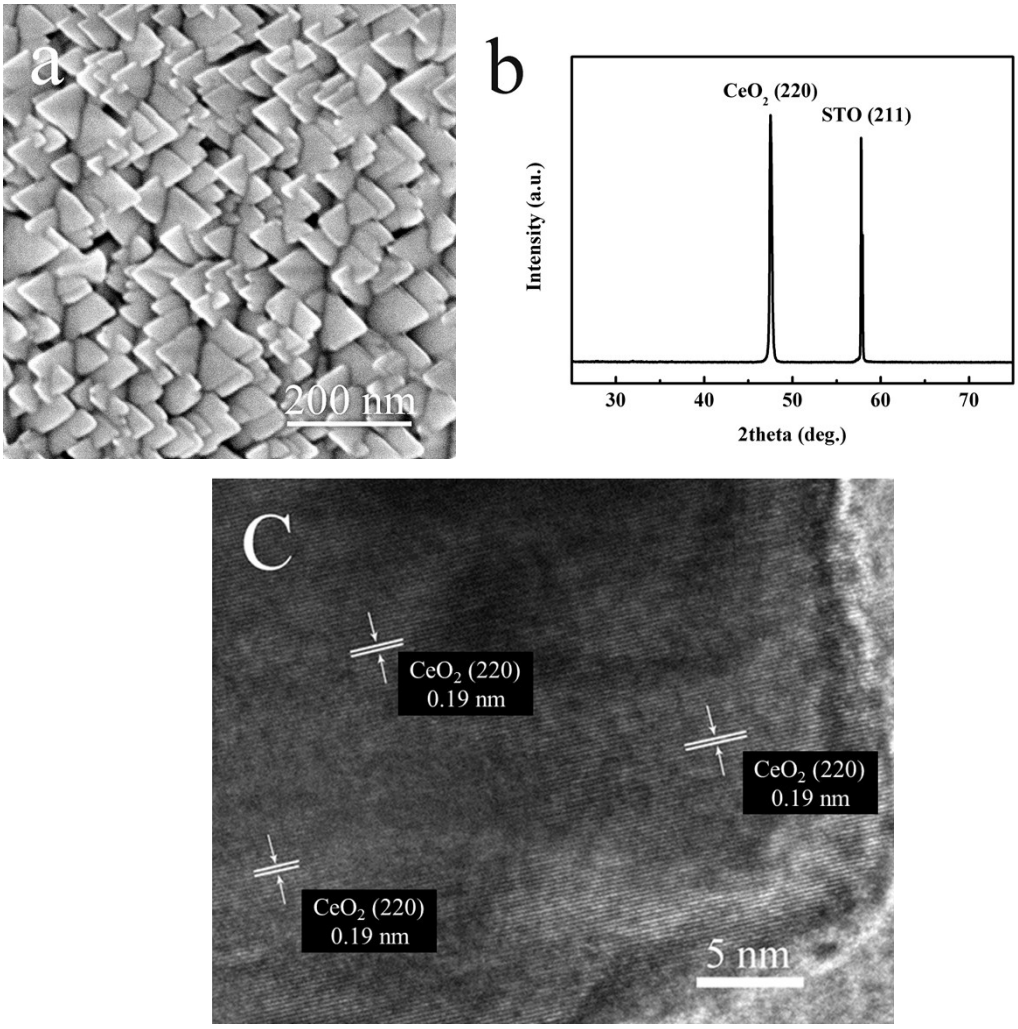


**Figure S3.** (a) SEM image of $CeO_2$ film on STO (211) substrate. (b) XRD pattern of $CeO_2$ film on STO (211) substrate. (c) HRTEM image of $CeO_2$ film on STO (211) substrate.

The $CeO_2$ film on STO (211) was prepared to confirm the terminated facet of the triangle-like nanosheets. From the SEM image (figure S3(a)), it is shown that the morphology is just like triangle-like nanosheets. According to the XRD pattern (figure S3(b)) and HRTEM (figure S3(c)), it can be confirmed that the orientation is along (110) facet.

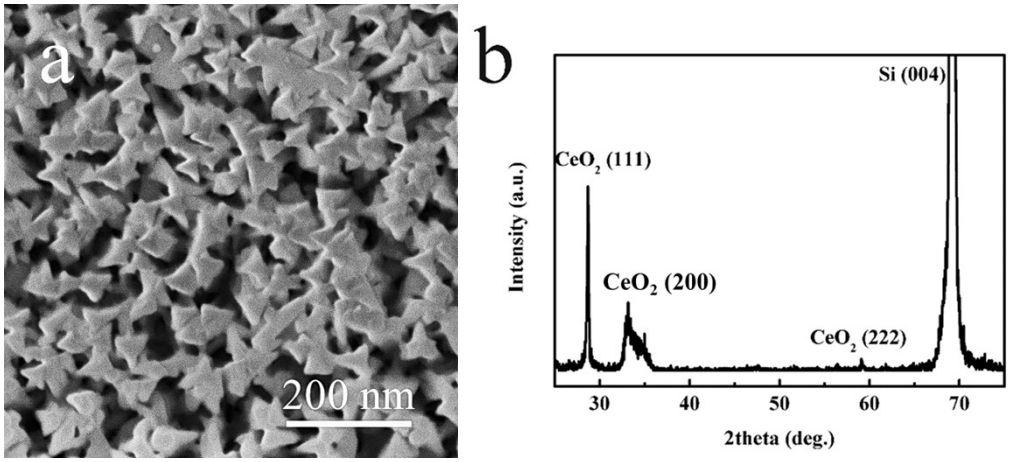


**Figure S4.** (a) SEM and (b) XRD of $CeO_2$ film on Si (001) substrate.

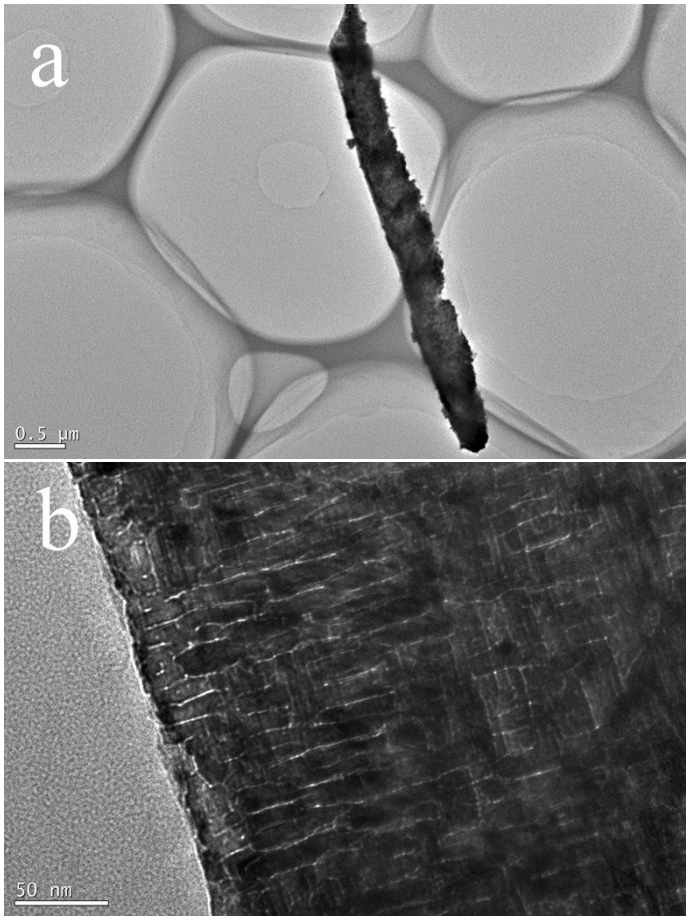


**Figure S5.** (a, b) TEM images of $CeO_2$ nanorods took from sample $S_5$.