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**Supporting Information**

# Graphene oxide-mediated formation of freestanding and thickness controllable metal oxide films

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The formation processes of $Fe_2O_3$ particles (1-4):

$$CO(NH_2)_2 + H_2O \Leftrightarrow CO_2 + 2NH_3 \quad (1)$$

$$NH_3 + H_2O \Leftrightarrow NH_4^+ + OH^- \quad (2)$$

$$Fe^{3+} + 3OH^- \rightarrow Fe(OH)_3 \quad (3)$$

$$2Fe(OH)_3 \rightarrow Fe_2O_3 + 3H_2O \quad (4)$$

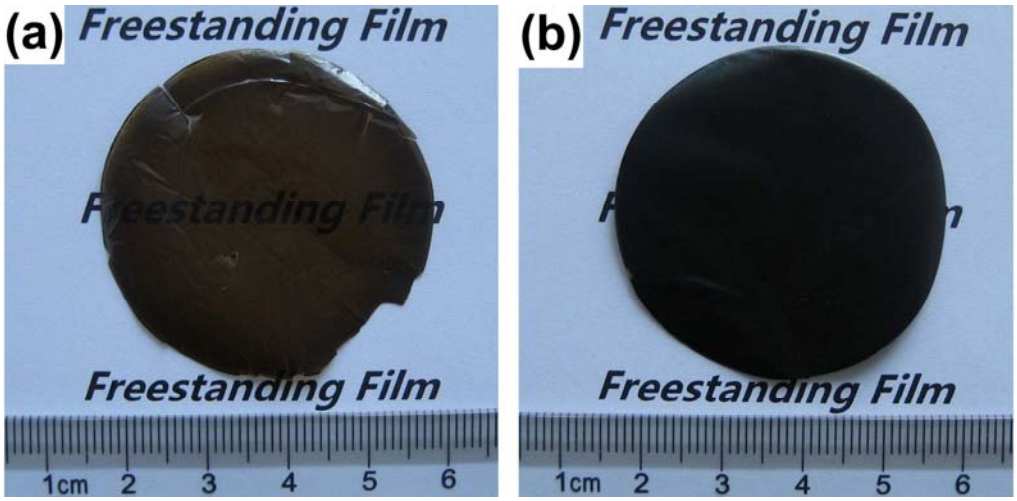


Fig. 1S Digital photos of freestanding composite films with different usage of GO-$Fe(OH)_3$ composites. (a) 1.0 mL; (b) 5.0 mL (1 mg/mL of GO)

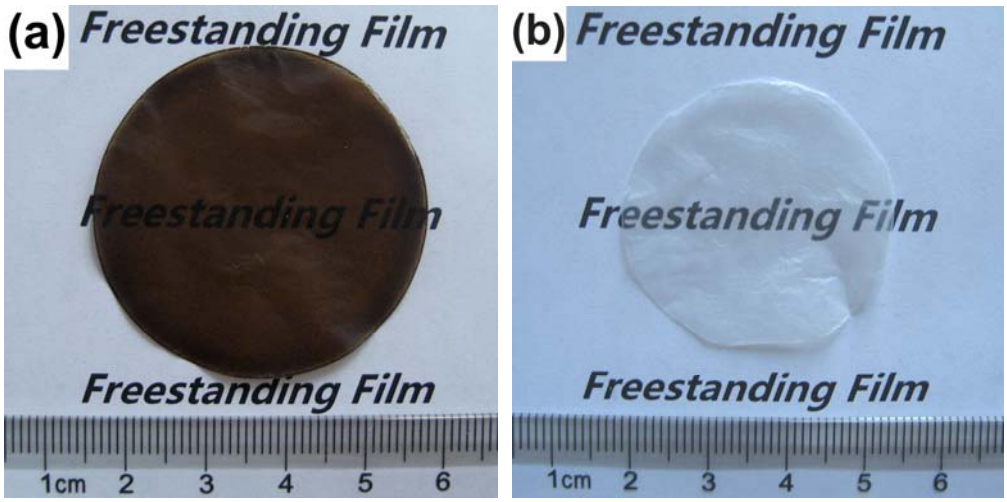


Figure 2S Digital photos of freestanding $TiO_2$ films before and after calcination, the usage of GO-$TiO_2$ precursor composites is 2.5 mL (1 mg/mL of GO).

GO-$Ti(OH)_4$ was prepared by hydrolyzing $Ti(SO_4)_2$ in the presence of GO. And the as-prepared composite sheets were assembled into freestanding films by filtration, following by peeled off from the filter after dried. The composite films were calcined in air from 50 to 500 $^oC$ at a heating rate of 1 $^oC$ /min, and tempered at 500 $^oC$ for 2 h. After cooling to room temperature, the freestanding $TiO_2$ films were obtained.

Table1S. The contents of carbon, oxygen and ferrum of samples obtained by XPS analysis

| samples | C (wt %) | O (wt %) | Fe (wt %) |
|---|---|---|---|
| GO-$Fe(OH)_3$ | 38.52 | 37.64 | 23.84 |
| $Fe_2O_3$ | 11.6 | 34.37 | 54.03 |

The higher contents of carbon, especially in $Fe_2O_3$ film, may derive from the conductive tapes which were utilized to fix these transparent thin films.