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## Supporting information (S)

Figure S1. XRD patterns of different samples.

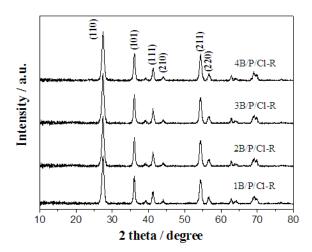
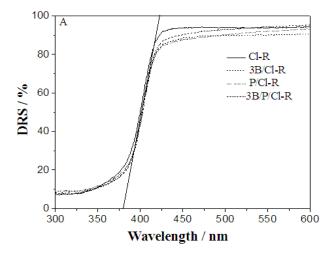


Figure S2. DRS spectra of different samples.



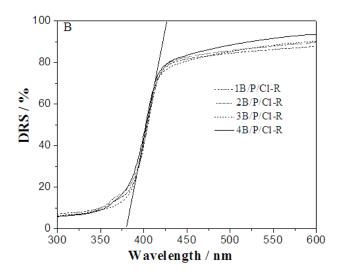
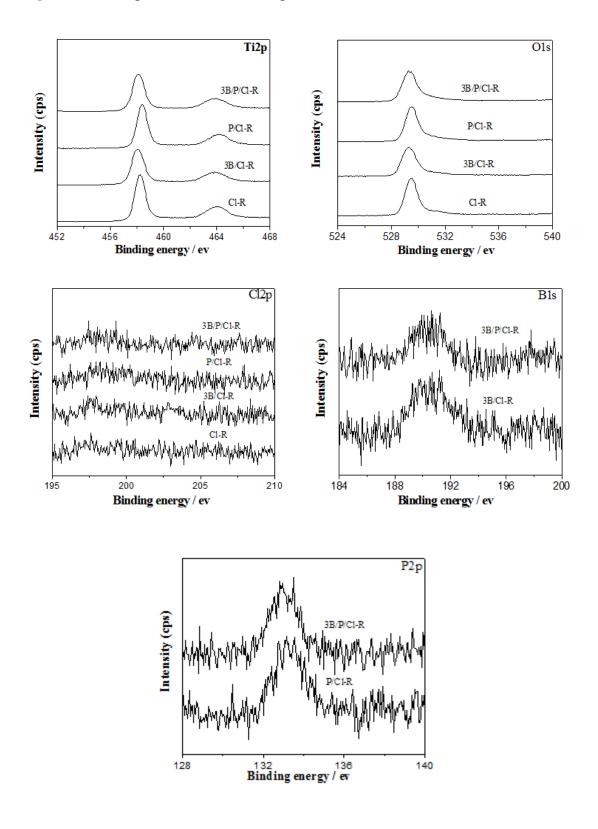
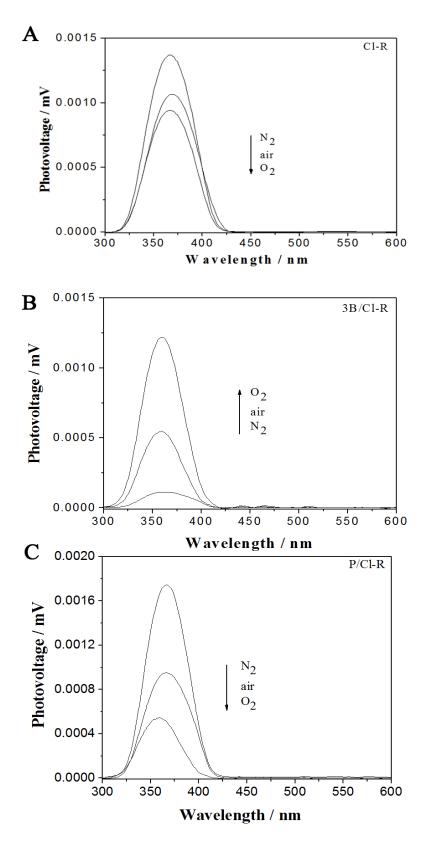


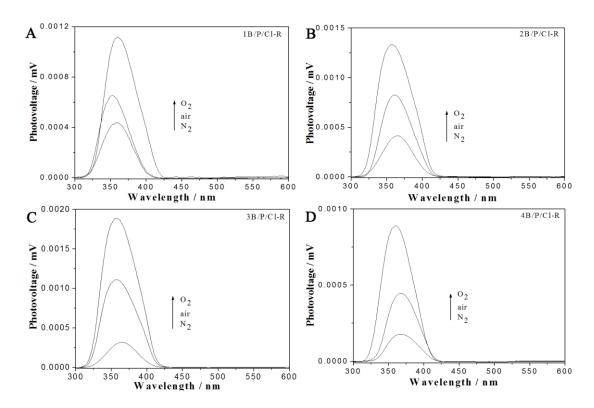
Figure S3. XPS spectra of different samples.



**Figure S4.** SPS responses of different samples in different  $O_2$ -concentration atmospheres.



**Figure S5.** SPS responses of different samples in different  $O_2$ -concentration atmospheres.



**Figure S6.** Fluorescence spectra related to hydroxyl radicals on different samples after irradiation for 1 h.

