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Mechanism study of N-H- and H-N-codoping TiO_2 photocatalyst for efficient degradation of benzene under visible light

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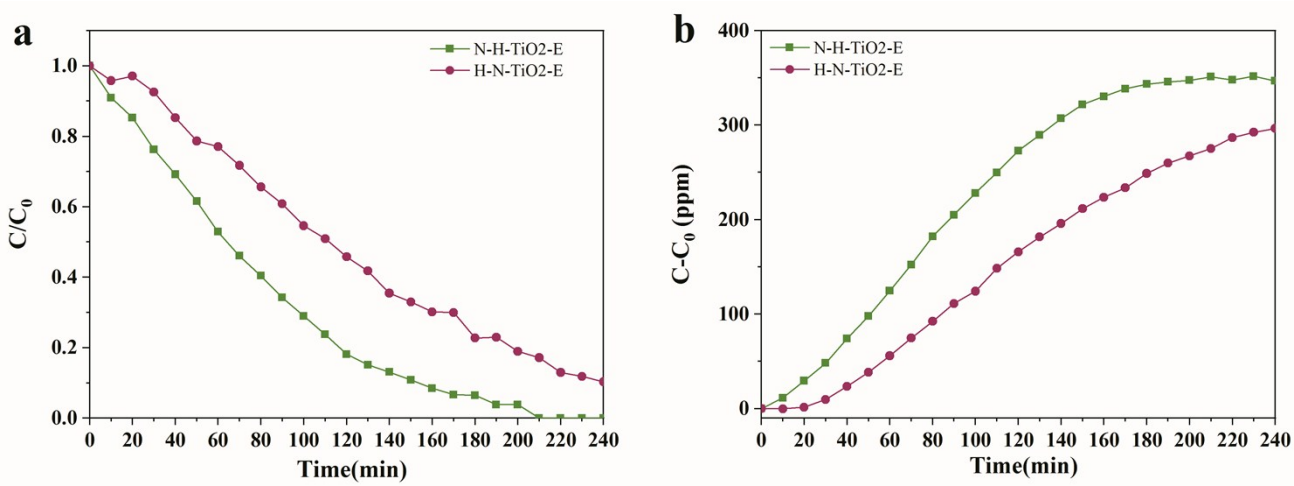
To confirm the influence of annealing atmosphere orders on the photocatalytic activity of TiO_2, we conduct the contrast test of N-H-TiO_2-E and H-N-TiO_2-E as presented in Fig .S1. N-H-TiO_2-E was obtained by annealing in NH_3 for 2h and then held in H_2 for 4 h. Similarly, H-N-TiO_2-E was obtained by treating in H_2 for 4h and NH_3 for 2h.The photocatalytic activity of N-H-TiO_2-E behaves better than H-N-TiO_2-E, which is accorded with the contrast between N-H-TiO_2 and H-N-TiO_2. It proves that N doping followed by H doping is better for improving the performance of TiO_2. In addition, the positive effect of H doping is also confirmed by the contrast of H-N-TiO_2 and H-N-TiO_2-E, as well as N-H-TiO_2 and N-H-TiO_2-E respectively, shown in Fig .S2. Because of the special disordered surface layer by H doping, the absorption ability is efficiently enhanced and the surface active sites are more produced, thus results in the higher mineralization rate of benzene.



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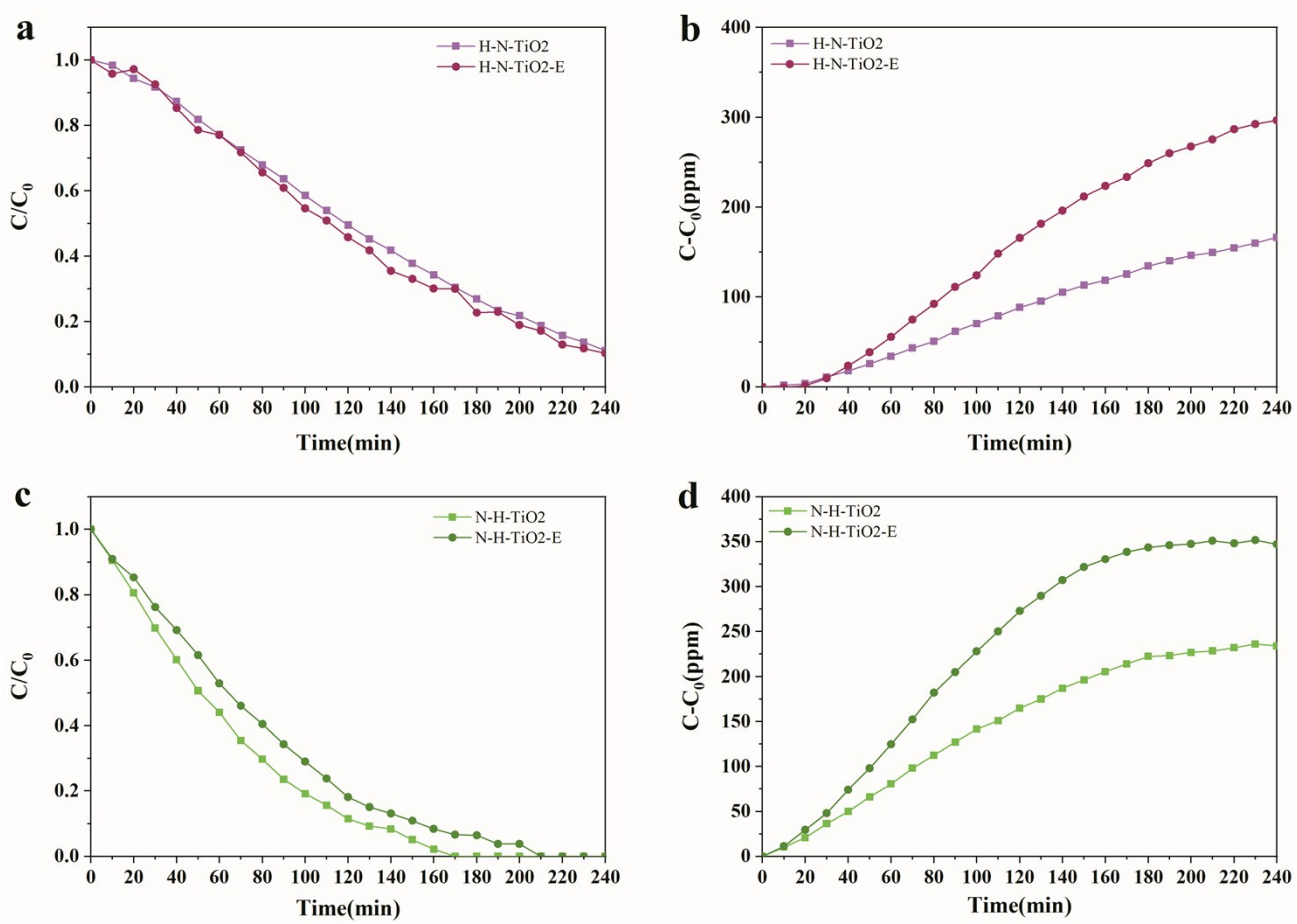

Fig. S2. (a, b) the contrast tests of the photocatalytic activity between H-N-TiO_2 and H-N-TiO_2-E under visible light; (c, d) the contrast tests of the photocatalytic activity between N-H-TiO_2 and N-H-TiO_2-E under visible light.