Highly Efficient Visible-Light-Driven Photocatalytic Activities in Synthetic Ordered Monoclinic $BiVO_4$ Quantum Tubes-Graphene Nanocomposites

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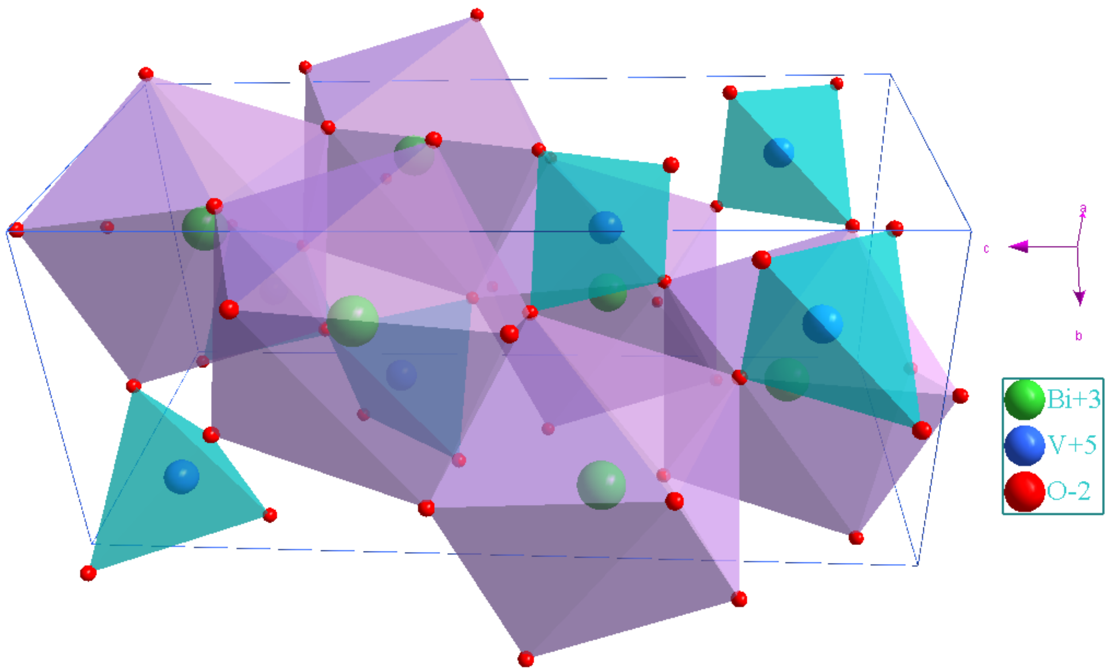

Figure S1. Schematic crystal structure of monoclinic $BiVO_4$. The structure of m-$BiVO_4$ consists of corner-sharing BiO_8 dodecahedra and VO_4 tetrahedra. The presence of a Bi–O dodecahedral distortion due to the $6s^2$ lone pair of Bi^{3+} and a calculated band gap of 2.2 eV makes it suitable for a visible-light-driven photocatalyst, with the potential applications in purifying polluted water resouces.

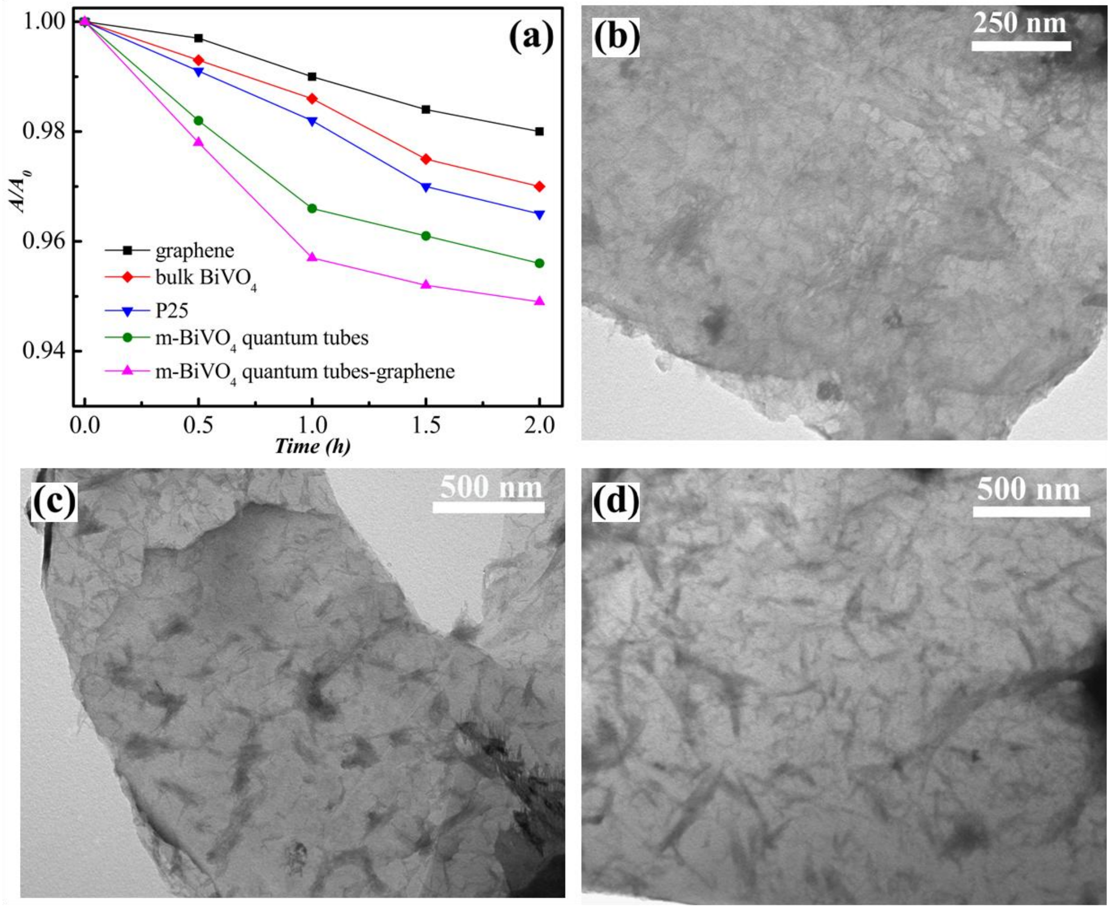

Figure S2. (a) Concentration change curves of dye molecules over pure graphene, P25, bulk $BiVO_4$, monoclinic $BiVO_4$ quantum tubes and ordered monoclinic $BiVO_4$ quantum tubes-graphene nanocomposites under dark, taking the rhodamine B as an example; TEM images of ordered monoclinic $BiVO_4$ quantum tubes-graphene nanocomposites after visible-light photodegradation of (b) rhodamine B molecules, (c) methylene blue molecules and (d) methyl orange molecules.

Figure S2a shows the concentration change curves of dye molecules in the dark over pure graphene, P25, bulk $BiVO_4$, monoclinic $BiVO_4$ quantum tubes and ordered monoclinic $BiVO_4$ quantum tubes-graphene nanocomposites, taking the rhodamine B as an example. As displayed in Figure S2a, one can clearly see that there are no obvious differences in the adsorbance of rhodamine B among the above five materials, inferring that the process of adsorption equilibrium in dark do not have an apparent influence on the estimation of their photocatalytic properties. Figures S2b, c and d depict the TEM images of ordered monoclinic $BiVO_4$ quantum tubes-graphene nanocomposites after visible-light photodegradation of rhodamine B, methylene blue and methyl orange. Obviously, the morphologies of ordered monoclinic $BiVO_4$ quantum tubes-graphene nanocomposites in Figures S2b-d have no obvious variations after the measurement of photocatalytic properties, clearly revealing their excellent durability.