Novel Visible-Light-Sensitive Photocatalyt for Indoor Environmental Purification

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Efficient visible-light-sensitive photocatalyst has been developed based on the Cu(II) or Fe(III) nanoclusters grafted titanium dioxide (TiO_2). We adopt the two novel concepts for developing the efficient photocatalysts, *i. e.* interfacial charge transfer for visible light absorption and multi-electrons reduction of oxygen molecules.[1-10] When the nanoclusters of Cu(II) or Fe(III) amorphous oxides are grafted onto the TiO_2 surface, electrons in the valence band of TiO_2 can be excited to the surface nanoclusters through the interface under visible light irradiation. Excited holes in the valence band of TiO_2 have strong oxidative activities and can decompose organic contaminants or bacteria, while the electrons in Cu(II) or Fe(III) nanoclusters react with oxygen molecules through the efficient multi-electrons reduction process. The quantum efficiency of our optimized photocatalyst achieves over 90 % under visible light irradiation.[9] The nanoclusters grafted TiO_2 causes efficient photocatalytic oxidation activity and super-hydrophilic conversion even under indoor light illumination like commercial white fluorescent bulb or white light emitting diode (LED). Our photocatalysts exhibited significant air purification, self-cleaning, and anti-pathogenic effects under regular indoor lighting. We have also conducted the field test at hospitals and international airports to confirm the excellent anti-bacterial and deodorization properties of our photocatalysts at indoor building environment.

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