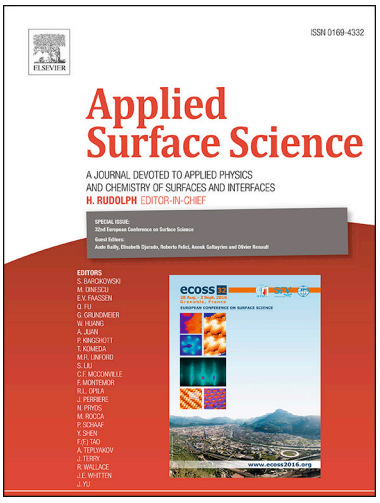

Full Length Article

3D hierarchical structures MnO_2/C: A highly efficient catalyst for purification of volatile organic compounds with visible light irradiation

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3D hierarchical structures MnO_2/C: a highly efficient catalyst for purification of volatile organic compounds with visible light irradiation

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This work mainly focuses on exploring carbon coated ε-MnO_2 (ε-MnO_2/C) with 3D hierarchical structures for degradation of gaseous toluene under visible light. Influence of C-coating on surface adsorption, visible-light activity and photocatalytic activities of C-coated MnO_2 have been investigated. The results indicate that the C-coating behave as the adsorption and electron-transfer system, and the resulting C-coated ε-MnO_2 could extend the optical response from UV to visible light region, which can generate more electron−hole pairs. The photocatalyst ε-MnO_2/0.45C exhibited excellent visible-light photocatalytic activities, with degradation rate of toluene up to 87.34% in 70 min, but no photocatalytic activity could be observed for the pure ε-MnO_2. The PL spectra and photocurrent response results indicate that the composite structure can not only enhance the utilization of visible light but also consequently reduce electron (e^-)-hole (h^+) pair recombination, which improve the photocatalytic efficiency of the composite photocatalyst. This work provides a facile and economic approach for fabricating photocatalysts with high efficiency for degradation of VOCs under visible light at room temperature.

Keywords: C-coated MnO_2, Visible light, Room-temperature, Toluene degradation