Synthesis of porous graphene/TiO2 by use of recycled graphite

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SUMMARY:

Abstract.

Graphene-based nanomaterials are a kind of new technological materials with high interest for physicists, chemists and materials scientists. Graphene is a two-dimensional (2-D) sheet of carbon atoms in a hexagonal configuration with atoms bonded by sp_2 bonds. These bonds and this electron configuration provides the extraordinary properties of graphene, such as very large surface area, a tunable band gap, high mechanical strength and high elasticity and thermal conductivity [1].

Graphene has also been investigated for preparation of composites with various semiconductors like TiO_2, ZnO, CdS aiming at enhanced photocatalytic activity for their use for photochemical reaction as water splitting or CO_2 to methanol conversion [2-3].

In this communication, the synthesis of porous graphene@TiO2 obtained from a powder graphite recycled, supplied by ECOPIBA, is presented. This graphite was exfoliated, using a nonionic surfactant (Triton X-100) and sonication. Titanium(IV) isopropoxide was used as TiO_2 source. After removing the surfactant with a solution HCl/*n*-propanol, a porous solid is obtained with a specific area of 358 m_2g_{-1}. The solid was characterized by XRD, FTIR, XPS, EDX and TEM. Figure 1 shows the graphene 2D layer bonded with nanoparticles of TiO_2. When a water suspension of this material is exposed with UV-vis radiation, water splitting reaction is carried out and H_2/O_2 bubbles are observed (Figure 2)

References

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