Research Lectures

Tuesday, 3/12/2019, 14:00-15:00, Room K2.A1

Graphitic carbon nitride and its composites for photocatalysis

Removal of xenobiotics from waters

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Abstract

Graphitized carbon nitride (g-C_3N_4) is considered to be a promising semiconductor material that has been intensively investigated over past several years. Due to its structure based on tri-s-triazine (C_6N_7) blocks and strong covalent bonds between carbon and nitrogen atoms, it has similar mechanical properties to diamond and is thermally, chemically and photochemically stable. An important characteristic of g-C_3N_4 is energy of band gap of 2.7 eV, which enables light absorption at about 460 nm. Oxidation-reduction potentials corresponding to the conduction and valence band are of -1.3 eV, resp. 1.4 eV (against NHE), which is suitable for many photocatalytic applications. The disadvantage of g-C_3N_4 is the rapid recombination of photoinduced electrons and holes which has been solved by forming heterojunction composites with metal oxides, inorganic salts noble metals etc. Recently, the heterojunction composites of g-C_3N_4 with TiO_2, SnO_2 and$BiOIO_3$were investigated for various photocatalytic applications.

The utilization of pharmaceutical products has been continually increasing all over the world. The presence of pharmaceuticals and their metabolites in waters is beginning to be a serious problem for humans and animals. These compounds get to waters from various sources, such as disposals from hospitals and households, excretions by humans and animals, and it is important to develop new and effective technologies for their removal from wastewaters and the whole aquatic ecosystem. The effort to remove pharmaceuticals from waters is based on photocatalysis and adsorption on various adsorbents. TiO_2 and g-C_3N_4 were tested for the photocatalytic decomposition of paracetamol, ibuprofen and diclofenac. The same pharmaceuticals were adsorbed on active carbon and montmorillonite.

Short CV

Petr Praus has completed his PhD in the field of Analytical Chemistry at the University of Pardubice (Czech Republic) in 1995. He worked in several commercial analytical laboratories and in 2002 entered the VŠB-Technical University of Ostrava (VŠB-TUO) (Czech Republic). Since 2013 he has been working as a full professor in the field of Material Sciences and Engineering here. He is a head of the Department of Chemistry and a senior researcher at the Institute of Environmental Technology (both VŠB-TUO). His research is focused on the synthesis, characterization and application of nanomaterials and development of analytical methods. He has published more than 70 papers in reputed journals with impact factors.