

Iron and/or Titanium Containing Microporous Silico-Alumino-Phosphates as a Photocatalyst for Hydrogen Production by Water Splitting

Authors : I. Ben Kaddour, S. Larbaoui

Abstract : Since their first synthesis, the Silicoaluminophosphates materials have proved their efficiency as a good adsorbent and catalyst in several environmental and energetic applications. In this work, the photocatalytic hydrogen production from water splitting reactions has been conducted under visible radiations in the presence of a series of iron and/or titanium-containing microporous silico-alumino-phosphates materials synthesized by hydrothermal method, using triethylamine as an organic structuring agent to obtain the AFI structure type. These photo-catalysts were then characterized by various physicochemical methods to determine their structural, textural and morphological properties such as X-ray diffraction (XRD), Fourier transformed infrared spectroscopy (FTIR), scanning electron microscopy (SEM) coupled with X rays microanalysis, nitrogen adsorption measurements, UV-visible diffuse reflectance spectroscopy (UV-Vis-DRS), and X-rays photoelectron spectroscopy (XPS) and the analysis revealed that these materials have significant photocatalytic properties. The hydrogen production process has been followed by photoelectrochemical characterization (PEC). The results showed that hydrogen is the only gas produced, and the reaction takes place in the conduction band where water is reduced to hydrogen. The electron recombination has also been avoided, as holes are entrapped using hole scavengers. In addition, these catalysts have been shown to remain stable during reuse for up to five cycles.

Keywords : photocatalysis, SAPO-5, hydrothermal synthesis, hydrogen production

Conference Title : ICCHC 2023 : International Conference on Chemistry and Heterogeneous Catalysis

Conference Location : Paris, France

Conference Dates : November 27-28, 2023