Synthesis of BiVO$_4$ nanoparticles by the co-precipitation method and study the crystal structure, optical and photocatalytic properties of them

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Abstract: In this paper, the bismuth vanadate (BiVO$_4$) nanoparticles were synthesized at 600 °C calcination temperature by co-precipitation method. To study the crystal structure, morphology, optical and photocatalytic properties of the samples, the X-ray diffraction analysis, field emission scanning electron microscopy, energy-dispersive X-ray spectroscopy, Fourier-transform infrared spectroscopy and ultraviolet–visible spectroscopy were used. The X-ray diffraction patterns were indicated that the BiVO$_4$ samples have a monoclinic structure. The ultraviolet-visible analysis was revealed the BiVO$_4$ samples have an optical band gap in the visible light range. The photocatalytic activities of the synthesized BiVO$_4$ were evaluated by photodegradation of Congo red under visible light irradiation. According to the results of the analysis, the synthesized nanoparticles is a good choice for the degradation of organic matter into the sunlight.

Keywords: bismuth vanadate nanoparticles; BiVO$_4$, co-precipitation; crystal structure; photocatalytic.