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Sol-gel Pechini preparation of $CuEr_2TiO_6$ nanoparticles as highly efficient photocatalyst for visible light degradation of acid red 88

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Abstract

This study reports preparation of $CuEr_2TiO_6$ nanoparticles using Pechini sol-gel method. The characterization of nanoparticles was carried out using FESEM, EDX, XRD, PL, DRS, Raman, and FTIR. DRS analysis shows that the prepared nanoparticles can serve as an effective visible light photocatalyst. Photocatalytic activity of the prepared nanoparticles was investigated toward degradation of aqueous solution of acid red 88 (AR88) under visible light irradiation. The highest photoactivity (91.2%) was achieved after 150 min illumination using 40 mg of the photocatalyst. Effect of some contributing factors was studied on degradation rate of AR 88, including amount of photocatalyst and H_2O_2 concentration. Also, in order to examine stability of the prepared nanoparticles for long-time applications, the recyclability experiments were conducted at 7 successive reaction cycles which confirm the great stability of the prepared nanoparticles. Also, radical scavenging experiments reveal that the dominant species in photocatalytic reactions are hydroxyl radicals.