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Abstract: In this study, we have constructed ZnCr-LDH/g-C_3N_4 composite photocatalysts via in-situ synthesis approach. This composite material was used as catalyst interlayer of BPM to promote water dissociation. Results indicated that the combination of ZnCr-LDH and g-C_3N_4 could effectively improve the photoelectrocatalytic water dissociation activity. When the experiment time lasted for 1 h, the pH decreased to 1.52 in compartment 2, and increased to 13.11 in compartment 4 by using ZnCr-LDH/g-C_3N_4 composite catalyst.

Keywords: ZnCr-LDH/g-C_3N_4; Photoelectrocatalysis; Water dissociation; Bipolar membrane; Optical material

1. Introduction

Metal-free layered graphitic carbon nitride (g-C_3N_4), a novel two-dimensional semiconductor carbon nanomaterial, has attracted much attention due to its unique structure and properties [1, 2]. Moreover, g-C_3N_4 has suitable band gap of 2.7 eV and excellent optical absorption in visible region, which imply that g-C_3N_4 should be an ideal candidate material in photocatalytic fields [3]. Nevertheless, high recombination rate of photogenerated electron–hole pairs and low specific surface area of g-C_3N_4 are most drawbacks that affect the photocatalytic activity [4, 5]. To overcome these problems, some efforts have been made, including doping with metal or nonmetal elements, coupling with other semiconductor materials to form composites, and sensitizing by organic dyes [6-8]. Various hybrid composites have been developed to improve the catalytic activity [9-11], some g-C_3N_4 based heterojunction photocatalysts have also been