22nd Iranian Inorganic Chemistry Conference,
23-25 August, 2023
University of Kurdistan

Boosted photocatalytic decolorization of MB, RhB, and MO by perovskite-based heterojunction structures

Mahdieh Ghobadifard, Sajjad Mohebbi*

Department of Chemistry, Faculty of Science, University of Kurdistan, Sanandaj, Iran

* *E-mail: sajadmohebi@yahoo.com*

The entry of water contaminated with organic dyes cause to raised toxicity levels of water and damage to organisms [1]. During the last years, inorganic perovskite oxides, have attracted significant research interest due to their specific physical and chemical properties [2,3]. Cerium oxide has the eligibility of high dielectric constant, natural plenty, inexpensive, and variable valence states between Ce^{3+} and Ce^{4+} [4]. The investigation on Ce-based perovskites are barely up to now [5]. In addition, the effect of Ce doping on the $PbTiO_3$ physical properties has not been studied. However, it is known that the semiconductors with a heterojunction structure, is one of the most effective procedures to increase the active sites of catalysts and decrease the charge recombination rate of them [5]. Here, the $CeCoO_3/MoS_2$ heterojunction and co-doped perovskite Ce-Co-$PbTiO_3$ was successfully synthesised by the hydrothermal method. Their morphology and photocatalyst performance were considered in detail. The result in optimal conditions was compared to that of pure perovskite. Because of the decrement of charge recombination rate and fast charge transfer between perovskite and nanoparticles, the heterojunction structure illustrated a higher photoactivity on decolorization of MB, RhB, and MO than the pure perovskite. These photocatalysts could supply a qualified method to using them as an impressive candidate for the conversion of organic dyes in the water.

Keywords: Photocatalyst, Perovskite, Conversion of dyes, Heterojunction

References

[1] J. Sharma, K. L. Ameta, *Asian J. Chem.*, **2017**, 29(11), 2475.
[2] S. B. Hammouda, F. Zhao, Z. Safaei, V. Srivastava, D. L. Ramasamy, S. Iftekhar, M. Sillanpää, *Appl. Catal. Environ.*, **2017**, 215, 60.
[3] I. W. Hwang, Y. Liu, S. H. Park, Spectrochim. *Acta - Part a Mol. Biomol. Spectrosc.*, **2019**, 207, 68.
[4] N. Maheswari, G. Muralidharan, *Energy Fuel*, **2015**, 29(12), 8246.
[5] Q. Wang, Z. Li, M. A. Bañares, L. T. Weng, Q. Gu, J. Price, W. Han, K. L. Yeung, *Small*, **2019**, 15(42), 1903525.