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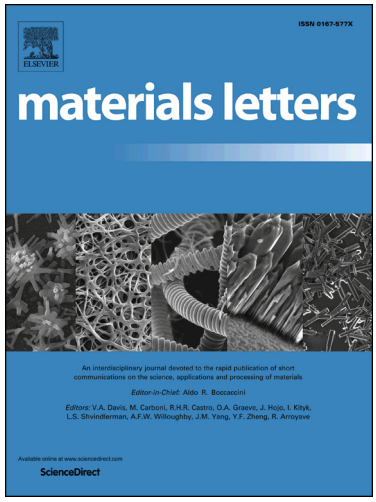

Augmented Photocatalytic and Electrochemical Activities of Ag Tailored $LaCoO_3$ Perovskite Semiconductor

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ABSTRACT

Inorganic perovskite materials have drawn significant interest in photocatalytic application owing to their excellent photo absorbing nature. In this regard, we have synthesized pristine and silver (Ag) modified lanthanum cobaltite ($LaCoO_3$) perovskite by hydrothermal method and characterized by multi-technique approaches. The structural, absorption and emission studies reveal that addition of Ag influences the crystallite size, absorption co-efficient and electron hole recombination rate of $LaCoO_3$. Morphological analysis shows that tetragonal morphology of the pure $LaCoO_3$ is changed to square shape morphology on addition of Ag, which reveals the dispersion of Ag into $LaCoO_3$. Electrochemical analysis demonstrates the possible electrochemical activity of the materials and confirms that Ag provides higher charge transfer kinetics and stability to $LaCoO_3$. In addition, Ag-$LaCoO_3$ degrades methylene blue (MB) in higher rate (99 % in 10 min) compared to $LaCoO_3$ (75 % in 10 min). Mechanism behinds the photocatalytic activity has been discussed. Hence, the present investigation explores Ag modified $LaCoO_3$ as a new-potential candidate for the application in photocatalytic activity under sunlight irradiation.

Keywords: Inorganic perovskite, Lanthanum cobaltite, Silver, Electrochemical activity, Photodegradation.

1. Introduction

Nowadays, increase in textile and industrial waste organic dyes are one of the most threatening factors in the universe. To overcome the threatening factor, photocatalytic organic degradation using solar energy has attracted much attention due to its simplicity, low cost and zero environmental pollution. Moreover, solar energy is potentially clean and renewable energy. Hence, development of a solar energy harvesting photocatalytic material is highly important [1, 2].