Tuning the Band gap Of BaTiO3 by rGO Incorporation for Photovoltaic Application

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Abstract

Band-gap engineering of ferroelectric oxides has emerged as an effective strategy to enhance their photoresponse for solar energy and optoelectronic applications [1–3]. In this work, reduced graphene oxide (rGO) incorporated $BaTiO_3$ nanocomposites were developed to tailor the band gap and improve charge transport properties for photovoltaic, photodiode, and photocatalytic applications. The incorporation of rGO introduces defect states and interfacial coupling, resulting in band-gap narrowing and extended visible-light absorption compared to pristine $BaTiO_3$. Structural and morphological analyses confirm the successful integration of rGO without altering the perovskite phase, while optical studies reveal enhanced light harvesting and reduced recombination losses. The rGO network facilitates rapid charge separation and carrier mobility, leading to improved photocurrent response and photodiode sensitivity [4]. Furthermore, the nanocomposites exhibit superior photocatalytic degradation efficiency under visible light irradiation. The synergistic interaction between ferroelectric $BaTiO_3$ and conductive rGO thus enables multifunctional performance, demonstrating the potential of these composites as efficient materials for next-generation photovoltaic devices, photodetectors, and environmental remediation technologies.

References

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