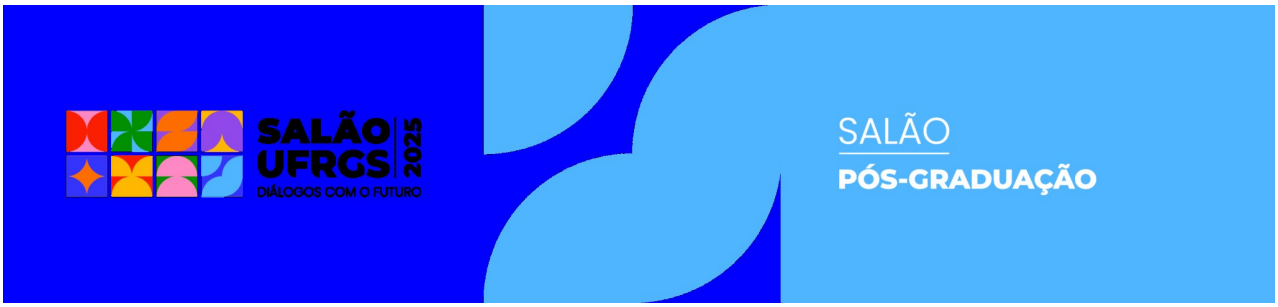


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Título	Interaction of nickel clusters with polymeric carbon nitride and its effects on photocatalytic hydrogen production
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Interaction of nickel clusters with polymeric carbon nitride and its effects on photocatalytic hydrogen production

Abstract

The design and synthesis of artificial photocatalysts with high activity have garnered significant scientific attention globally as a potential solution to the global energy and environmental crisis. Polymeric carbon nitride (CN) has shown considerable potential in the field of photocatalysis due to its unique properties. However, the high recombination rate of photoinduced electron-hole pairs severely limits the photocatalytic efficiency of pristine CN. This study investigates the synthesis and the deposition of nickel (Ni) cocatalysts over CN aiming for photocatalytic hydrogen (H_2) production reaction. The research focuses on understanding the structural, compositional, and optoelectronic properties of CN-Ni systems. CN was synthesized via thermal polycondensation of melamine and subsequently loaded with Ni using magnetron sputtering, with the Ni loading controlled by varying the deposition time (from 0 to 10 minutes). Detailed analyses were conducted using UV-Vis spectroscopy, X-ray photoelectron spectroscopy (XPS), X-ray absorption spectroscopy (XAS), FTIR, scanning electron microscopy (SEM), and X-ray diffraction (XRD). The results indicate that nickel is present in the Ni^{2+} state as NiO_x and $Ni(OH)_x$ species. The deposition induces changes in the chemical environment of CN, particularly in the nitrogen bonding states, which is believed influence photocatalytic performance. This study provides valuable insights into the role of non-noble metal cocatalysts in photocatalysis, demonstrating a promising approach for H_2 evolution via photolysis.