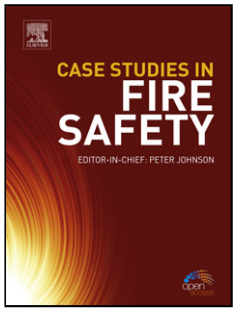

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Wet etching of dilute nitride GaInNAs, GaInNAsSb, and GaNAsSb alloys lattice-matched to GaAs

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Highlights

- The etch rates of dilute nitrides were found to increase by the presence of Sb.
- Enrichment of In was detected on GaInNAs surfaces by XPS.
- Enrichment of In was associated with smoother surface and enhanced photoluminescence.

Abstract

We have studied the etching of GaInNAs, GaInNAsSb, and GaNAsSb alloys by NH_4OH, H_2SO_4, and H_3PO_4 based solutions. NH_4OH based solutions resulted in smooth surface, while other solutions created rougher and granular surfaces. The etch rates were found to increase with the Sb content. For GaInNAs, x-ray photoelectron spectroscopy revealed the enrichment of In on the etched surfaces, indicating In or In oxides having a smaller removal rate compared to Ga or Ga oxides. The enrichment of In was associated with smoother surfaces after etching and an enhanced photoluminescence caused by lower surface recombination due to reduced surface state density.

Keywords: A. Alloy; B. AFM; B. XPS; C. Acid corrosion; C. Alkaline corrosion; C. Passivity