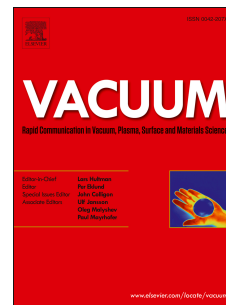


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A comparative study of Ti and Cr based p-ohmic contacts on high power GaAs laser diodes

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Abstract- The present work involves a comparison of sequentially evaporated Ti/Pt/Au and Cr/Au p-ohmic contacts for high power laser diode fabrication. Subsequently, the contacts were annealed at 440 °C in furnace annealing under N₂ ambient and their surfaces were evaluated by optical and electron microscopy. The specific contact resistivity of the contacts was determined by circular transfer length method (c-TLM). Secondary ion mass spectroscopy (SIMS) analysis of the annealed contacts indicates considerable intermixing of the metal and Ga atoms across the interface for Cr/Au contact. On the other hand, insignificant intermixing of atoms was observed in Ti based contacts. The electrical and optical characteristics of the laser diodes formed with Ti/Pt/Au ohmic contact suggest superior performance compared to the diode formed with Cr/Au contact.

Key words: Laser diode, ohmic contact, SIMS, Surface morphology

1. INTRODUCTION

GaAs based high power laser diodes operating at 808 nm are widely employed for optical pumping of Nd:YAG solid state lasers [1,2]. Apart from the proper design of diode epi-layer structure, the prerequisite condition for an efficient laser diode demands low series resistance, minimal Joule heating and low threshold current. The diode series resistance is the combination of contact resistance which is the interfacial resistance between ohmic metal and the semiconductor and the bulk resistance which includes the whole epitaxial structure of the laser diode. Since the bulk resistance of the laser diode cannot be altered, the contact resistance may be minimized by

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