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EFFECT OF LOW-IONIZATION GAS ADDITIVE ON CO₂ TEA LASER OPERATION

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ABSTRACT- We have used a simple mathematical technique to study the enhancing of electron density, current density, gain peak, gain peak arrival time, and population of the upper laser level in transversely excited atmosphere TEA CO₂ laser as a result of the use of gas additive namely, tripropyl amine (TPA).

1. INTRODUCTION

low-ionization impurities have profound influence upon CO₂ laser gas discharge¹. This influence has been attributed to improved preionization. Undoubtedly, preionization improves when low-ionization seed gas is added, but it is observable that even a small quantity of an added seed gas has a large influence on the current voltage characteristics of the discharge hence the gain. The metastable nitrogen molecules in the discharge ionize a relatively low concentration of tri-n-propyl amine (TPA) in the laser gas mixture. This is a so-called penning reaction which is schematically given by



where M^{*} is a colliding particle in a metastable state having sufficient energy to ionize the particle S with a low-ionization level (7.23 eV for TPA)¹. In the present work we show the effect of TPA on number of parameters in the discharge and gain.