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Determination of ion wind velocity using the method of characteristics (MOC) and its application for drying of black turmeric (Curcuma aeruginosa Roxb) slices

Sumariyah[a]; Khuriati A.[a]; Fachriyah E.[b]; Pratiwi S.H.[a]
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[a] Department of Physics, Faculty of Science and Mathematics, Diponegoro University, Jl. Prof. Soedharto, Tembalang, Semarang, 50275, Indonesia

[b] Chemistry Department, Mathematics and Sciences Faculty, Diponegoro University, Jl. Prof. Soedharto, SH, Tembalang, Semarang, 50275, Indonesia

Abstract

Ion wind drying also called corona wind drying in this study using a pin-multi ring concentric electrode. The purpose of the research is to determine the velocity of the ion wind by the characteristic of the method (MOC) and to apply it for drying the black turmeric (Curcuma aeruginosa Roxb). In theory, the ion wind velocity is equal to the ion mobility multiplied by the electric field. In MOC, the ion mobility is obtained from the graph of the relationship between the electric corona discharge current and the applied high voltage. The ion wind produced by corona discharge has been drying of the black turmeric slices with an applied high voltage 4 kV, the gap electrode 6 mm and drying time 0-30 minutes with a 5 minute time interval. Sliced black turmeric was circle formed with a radius of 15 mm and a thickness of 2-8 mm with an interval of 2 mm thickness. According to the results obtained, a constant of comparing the ion wind velocity with the MOC.. Its value is around 102 which is hypotheses of the value of the relative permittivity the ion wind. The drying rate maximum of the black turmeric (Curcuma aeruginosa Roxb) slices occurs at the beginning of drying is after a 5 minute drying time. This characteristic for all the variations of the samples radius. This causes the moisture content of the black turmeric slices to drop drastically. © Published under licence by IOP Publishing Ltd.

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Determination of ion wind velocity using the method of characteristics (MOC) and its application for drying of black turmeric (*Curcuma aeruginosa Roxb*) slices

Sumariyah[1], A Khuriati[1], E Fachriyah[2] and S H Pratiwi[1]

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Preface

Papers

Growth and fabrication of 850 nm AlGaAs/GaAs vertical cavity surface emitting laser structure

N I Cabello*, P M Tingzon, H A Husay, J D Vasquez, R Jagus, K L Patrocenio, K C Gonzales, G A Catindig, E A Prieto, A Somintac, A Salvador and E Estacio

National Institute of Physics, College of Science, University of the Philippines
NIP Bldg, National Science Complex, Diliman, Quezon City 1101, Philippines
E-mail: ncabello@nip.upd.edu.ph

Abstract. In this work, we demonstrate the NIP's all in-house development of a vertical cavity surface emitting laser structure. The VCSEL structure grown via MBE consists of an AlAs/AlGaAs distributed Bragg reflector and an AlGaAs/GaAs quantum well designed to issue at the 850 nm region. Reflectance spectroscopy showed that the stop band is centered around the designed wavelength. The electroluminescence spectra displayed that the maximum light emission corresponded to its design. This is a crucial step in the NIP's development of semiconductor lasers, leading towards future high-speed and highly-tunable VCSEL devices.

1. Introduction

Semiconductor lasers have been at the forefront of high-speed interconnects, thanks to the development of lasers capable of operating at gigahertz speeds [1]. Expansion to other applications such as proximity sensing [2] and light detection and ranging (LIDAR) [3] have driven further research on this field. For high-speed devices, switching speeds at the gigahertz range are desired [1], while high tuning speeds and increased tunability are sought for wavelength-tunable devices [4]. With its molecular beam epitaxy (MBE) and device fabrication facilities, the National Institute of Physics (NIP) has recently renewed its research thrust in this field, most notably on vertical cavity surface emitting lasers (VCSELs).

The VCSEL is a type of semiconductor laser with light emission orthogonal to the wafer plane. Its main advantages over other conventional semiconductor lasers such as edge-emitting lasers are the ease of coupling to optical fibers, direct wafer scale probing and low threshold operation [5]. A standard VCSEL design is composed of an optical cavity with an active region in the center, which is usually a quantum well (QW). The optical cavity is then sandwiched between two distributed Bragg reflectors (DBRs), which are highly reflecting mirrors composed of alternating high and low refractive index medium materials. The stop band of the DBR, which is the wavelength region with the highest reflectance, should coincide with the QW emission wavelength. Oxidation apertures, usually situated near the active region, are also employed for optical and current confinement [6].

In this paper, we report on the all in-house development of an AlGaAs/GaAs-based DBR VCSEL structure at the chip level. The whole process entails the whole production processes: the growth of the layers, device fabrication, and characterization of both as-grown and device-fabricated layers. Oxidation was also performed to explore the possibility of current and optical confinement effects [6].

2. Experimental Details