



Additions

MoP. Poster Session I

Monday 4th September 13:30 to 15:30

Invited Poster

MoP.83 Trap Assisted Gas Sensing Mechanism in SiC Capacitors: Ming-Hung Weng, Alton Horsfall, Rajat Mahapatra, Nick Wright. School of Electrical, Electronic and Computer Engineering, Newcastle University, Newcastle, NE1 7RU, U.K.

This paper reports the first observation of gas sensing using the leakage current through a capacitor fabricated on Silicon Carbide (SiC). The dielectric layer used in this sensor has a Titanium dioxide layer in addition to the thermally grown Silicon Dioxide (SiO₂) and this operates as an adhesion promoting layer to the catalytic metal gate contact. We have shown that the leakage current through this Pd/TiO₂/SiO₂/SiC capacitor structure is controlled by a trap assisted tunnelling mechanism, using a single barrier height and trap density. This barrier height is lowered in the presence of hydrogen gas at high temperatures, whilst the trap density in the dielectric remains unchanged. This shows that the formation of a charge dipole layer under the contact is responsible for the observed change in characteristics in the hydrogen environment, rather than a change to the bulk properties of the dielectric layer. Further, we show that this technique is not affected by the influence of interface traps, which dominate the low voltage capacitance characteristics at high temperatures, offering the opportunity for a simple, more rugged detection method.

TuP. Poster Session II

Tuesday 5th September 13:30 to 15:30

TuP.83 XRD and Photoluminescence whole-wafer mapping of 4H SiC wafers: Tom Ryan^{1, a}, John Hennessy², Colin Harrison², Shouyin Wang², Gyles Webster³, Akihiko Majima⁴; ¹1320 SE Armour Drive, Bend, OR, USA; ²Haxby Rd, York, UK; ³1550 Buckeye Drive, Milpitas, CA, USA; ⁴7-6 Higashi-Ueno 2-chome, Taito-Ku, Tokyo, Japan.

The commercial availability of SiC-based devices has been limited by a number of factors including wafer supply, cost, wafer size and crystal quality. Recently a number of vendors of 4H and 6H SiC wafers have emerged and 100mm diameter wafers are commercially available. All vendors now claim to meet or exceed the existing SEMI specifications M55-0304. Both SEMI and manufacturers' specifications focus on wafer dimensions and gross physical defects such as micro-pipes that are visible by optical inspection. In this paper we describe high-density XRD and PL mapping measurements on a series of nominally identical, semi-insulating 4H wafers from a range of manufacturers. We show very large variations in crystal quality, polytypism and doping/contamination within-wafer, from wafer-to-wafer and vendor-to-vendor. It is logical to assume that these variations may be responsible for observed variations in device properties and yield.

TuP.84 Micro-Photoluminescence mapping of defect structures in SiC wafers: John Hennessy¹, Tom Ryan^{2,a}; Nanometrics Inc ¹ Haxby Road, York, UK; ²1320 SE Armour Dr, Bend, OR 97701 USA.

Micro-photoluminescence can be used to image electrically active structural defects in SiC. Under suitable excitation conditions it is possible to observe both band-edge PL and near band-edge PL from recombination via a shallow boron acceptor. The intensity of the band-edge emission is related to the carrier lifetime – and is reduced

by the presence of structural or interfacial defects. The intensity of the deep level PL is a complex function of the number of radiative centers and the number of centers limiting carrier lifetime. Micro-PL mapping can provide information on the spatial distribution of electrically active defects in SiC.

Industrial News Session

Tuesday, September 5th 5:30 - 7:30 PM

SiC: A Future Vision

During the past few years there have been significant advances in both the materials growth and device fabrication technologies for SiC. The prospect of zero micropipe commercial material and reduced defect densities, coupled with increasing interest from potential end users should provide a platform for large scale commercialisation. However, history tells us that the commercialisation of a new technology is rarely that straightforward. In this year's industrial news session, eminent speakers, representing key areas of SiC technology, will give their future vision for SiC. The presentations will be followed by a facilitated discussion chaired by Roger Bassett of Areva Transmission and Distribution Technology Centre in which the drivers and inhibitors for large scale commercialisation will be examined.

Presenters:

Roger Bassett, Areva T&D

Adrian Powell, Cree Inc.

Asko Vehanen, Norstel

Philippe Roussel, Yole Développement

Affiliation/Author Changes

Affiliation Correction

Page: iii International Steering Committee

Chris Harris Cree Sweden

Co-Author Addition

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TuP.76 One-Dimensional Electronic State on the Si-Rich 4H-SiC(1-102) Surface: Chariya Virojanadara¹; Martin Hetzel¹; Ulrich Starke¹; ¹Max-Planck-Institut für Festkörperforschung

Affiliation Correction

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WeP.49 Comparison of Bipolar and Unipolar SiC Switching Devices for Very High Power Applications: Kent Bertilsson¹; Christopher I. Harris²; ¹Mid-Sweden University; ²Cree Sweden

Continued...



Cancellations

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Invited Poster

MoP.1 2-6 GHz SiC MMIC Microwave Power Amplifiers

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MoP.27 Effect of Ion Fluence and Beam Orientation on Damage Formation in Nitrogen Implanted 6H-SiC

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TuP.12 Improved Hydride-Vapor Phase GaN Epitaxy Provided by Compliance of Porous SiC Substrate

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TuP.31 Determination of Thermal and Optical Parameters of SiC Polytypes by Photopyroelectric Spectroscopy

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TuP.37 Radiation Induced Defects with Strong Spin-Spin Interaction in N-Type 6H-SiC

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TuP.83 Epitaxy of $(\text{SiC})_{1-x}(\text{AlN})_x$ Semiconductor Solid Solutions by Sublimation

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WeP.17 Raman Spectroscopy of n-GaN in Cubic Phase

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9:30 AM

Th9.2 Performance of 4H-SiC Alpha and Beta Particles, X Rays and UV Detectors after Irradiation up to $1\text{E}16 \text{ n/cm}^2$ By 1 MeV Neutrons