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Accession number:12648270

Title:Sidewall GaAs tunnel junctions fabricated using molecular layer epitaxy

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Source title:Science and Technology of Advanced Materials

Abbreviated source title:Sci. Technol. Adv. Mater. (UK)

Volume:13

Issue:1

Publication date:Feb. 2012

Pages:013002 (16 pp.)

Language:English

ISSN:1468-6996

CODEN:STAMCV

Document type:Journal article (JA)

Publisher:Elsevier Science Ltd.

Country of publication:UK

Material Identity Number:EN56-2012-001

Abstract:In this article we review the fundamental properties and applications of sidewall GaAs tunnel junctions. Heavily impurity-doped GaAs epitaxial layers were prepared using molecular layer epitaxy (MLE), in which intermittent injections of precursors in ultrahigh vacuum were applied, and sidewall tunnel junctions were fabricated using a combination of device mesa wet etching of the GaAs MLE layer and low-temperature area-selective regrowth. The fabricated tunnel junctions on the GaAs sidewall with normal mesa orientation showed a record peak current density of  $35\,000\text{ A cm}^{-2}$ . They can potentially be used as terahertz devices such as a tunnel injection transit time effect diode or an ideal static induction transistor.

Number of references:152

Inspec controlled terms:atomic layer epitaxial growth - current density - etching - gallium arsenide - III-V semiconductors - semiconductor epitaxial layers - semiconductor growth

Uncontrolled terms:sidewall tunnel junctions - molecular layer epitaxy - heavily impurity-doped gallium arsenide epitaxial layers - device mesa wet etching - low-temperature area-selective regrowth - current density - static induction transistor - GaAs

Inspec classification codes:A6855 Thin film growth, structure, and epitaxy - A8115H Chemical vapour deposition - A8115G Vacuum deposition - B2520D II-VI and III-V semiconductors - B0520F Chemical vapour deposition - B0520D Vacuum deposition

Chemical indexing:GaAs/bin As/bin Ga/bin

Treatment:Experimental (EXP)

Discipline:Physics (A); Electrical/Electronic engineering (B)

DOI:10.1088/1468-6996/13/1/013002

Database:Inspec

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