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Effect of epitaxial layer thickness on the electrical properties of Ti/n-AlGaAs grown by MBE

By: [Al-Ahmadi, NA](#) (Al-Ahmadi, N. A.)^[1]; [Al-Jawhari, HA](#) (Al-Jawhari, H. A.)^[1]

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Abstract

The effect of epitaxial layer thickness on electrical characteristics of two Ti/n-Al_{0.33}Ga_{0.67}As Schottky barrier diodes was studied in the temperature range of 300-420 K. Comparing the current-voltage (I-V) characteristics of two samples with epitaxial layer thicknesses of 2 μm and 1.5 μm discloses that the device with a thinner epitaxial layer has a higher barrier height and hence a lower reverse current. Specifically, we found that increasing the Al_{0.33}Ga_{0.67}As thickness from 1.5 μm to 2 μm would lower the value of the barrier height by similar to 12% at 300 K. We associated such retrogression of the electrical quality to the presence of deep level traps in the Si:AlxGa1-xAs layer. For both samples we found that the effective barrier height decreases with increasing the annealing temperature. Yet, the sample with a thinner layer showed more stability and less temperature dependence. (C) 2015 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

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Author Information

Reprint Address: Al-Ahmadi, NA (reprint author)
 King Abdulaziz Univ, Dept Phys, Jeddah 21589, Saudi Arabia.
Addresses:
 [1] King Abdulaziz Univ, Dept Phys, Jeddah 21589, Saudi Arabia
E-mail Addresses: nalahmadi@kau.edu.sa

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