

MARSDEN FUND REFEREE REPORT – STANDARD APPLICATIONS

Referee number: 7
Application number: 07-UOW-004
Panel: Physical Sciences & Engineering
Principal Investigator: Professor JB Scott
Title: Unconventional wide-bandgap circuits

PLEASE READ THE INSTRUCTIONS IN THE GUIDELINES BEFORE COMPLETING THIS FORM.

- Please type or neatly print your report.
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Section 1: REFEREE COMMENTS

REFEREE COMMENTS:

Please use the following headings, allocating as much space to each as you think is required:

1. Merit of the proposal
2. Potential of the researchers to contribute to the advancement of knowledge
3. Contribution to development or broadening of research skills in New Zealand, particularly those of emerging researchers.
4. How could the proposal be improved?

1. Merit of the proposal

- This is a very timely proposal in a very important semiconductor.
- Very little work has been done until now in the design of advanced nitride circuits.
- The project proposes some new applications for nitride semiconductors: medical diathermy, although it does not provide any quantitative reason regarding why this application should be good for nitrides. The other three proposed applications have been studied for a long time: vacuum-tube replacement, power conversion and linear amplifiers. The proposal does not offer any information to show that the researchers are going to offer new solutions.
- The title of the proposal is misleading: “Unconventional Wide-Bandgap Circuits”. Only the medical application is “unconventional”.
- It is a good idea to try to use the foundry-less model for the design of nitride devices. However, as of today there is no foundry available. The authors should demonstrate support from a foundry.

2. Potential of the researchers to contribute to the advancement of knowledge

- J. B. Scott has a long experience in the design of RF oscillators and amplifiers, although he has not worked with GaN before.
- A. M Teetzel has experience on the design of GaAs MMICs.
- A. Parker has experience on the characterization of GaAs microwave circuits and devices

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**SECTION 1: REFEREE COMMENTS
(continued)**

- I think this team represents a good opportunity to look at nitrides from a GaAs perspective. However, I think the proposal would be much stronger if they would have included in the team someone from nitrides.
- I have my doubts that the researchers will find a nitride foundry that will fabricate their circuits.

3. Contribution to development or broadening of research skills in New Zealand, particularly those of emerging researchers.

I fully agree with the authors of this proposal in that it is important for a small country to learn foundry-less fabrication. Very limited work is currently available in nitride circuits and there is a very good opportunity to make an impact. The circuits they propose are not very advanced or new but they represent a good starting point.

4. How could the proposal be improved?

- Adding someone to the research team with background in GaN devices
- Getting support letters from foundries as it is difficult to believe that they will get the process done.
- The researchers should have provided a contingency plan in case they do not find a suitable foundry.
- In this project the researchers are going to investigate 4 relatively-simple circuits. I think it would have been better if they would have proposed circuits of increasing difficulty.