MARSDEN FUND REFEREE REPORT – STANDARD APPLICATIONS

Referee number: 9

Application number: 07-UOW-004

Panel: Physical Sciences & Engineering

Principal Investigator: Professor JB Scott

Title: Unconventional wide-bandgap circuits

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- Please type or neatly print your report.

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?

Merit:

This is a very good proposal and outlines a strong program to develop GaN-based device circuits for microwave applications. All circuit/system applications indicated by the PI are applicable and suitable for implementation using GaN-based devices. The focus upon a 'design' kit has merit and would be very useful, and the emphasis upon integrating fabrication with modelling is likely to be successful. My only concern is the relative immaturity of the GaN-based technology. The devices are still under development and the technology is not yet stable, particularly from a reliability perspective. Although good reliability has been reported, the results are not consistently obtained. For this reason the devices are not yet established and device characteristics vary as modifications to the device design are implemented. This may limit the applicability of these devices until the reliability problems are solved. From this perspective, focus upon a circuits technology for these devices may be premature. However, the approach outlined by the PI is very solid and will likely produce interesting and useful results.

Potential of the researchers to contribute to the advancement of the knowledge:

The PI has a very good record of achievement and is likely to produce excellent results, if funded. He is well trained and published in the world's premier journals and conferences in the microwave devices and circuits areas.

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

The PI indicates collaboration with an Associate Investigator, Research/Technical Assistants, and Postdoctoral researchers. If the GaN-based device technology matures it will find application in a variety of practical systems, including base station transmitters for wireless communications, radar transmitters, and other applications. The technology is rapidly advancing and nearing commercialization. Training in the new technologies will be necessary to successfully establish a local industry. This proposal could contribute to this effort.

How could the proposal be improved?

The proposal is well written in its present form. However, it could be improved by inclusion of additional device physics issues to address the reliability and stability of the GaN-device technology. How these issues can be addressed with the modelling effort would enhance the proposal.