MARSDEN FUND REFEREE REPORT – STANDARD APPLICATIONS

Referee number:	3
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?

This proposal address the design, implementation and prototype demonstration of integrated circuits of GaN – one of a recent rapidly emerging semiconductor technology area, particularly for photonic and high-frequency amplifying applications. This technology is expected to have significant impact in many electronics and photonics systems. Hence, I feel the proposal is very timely and important because it can lead New Zealand into one of the new frontiers of semiconductor IC design.

The research proposed focused on the circuit design and validation aspects of these high-performance GaN ICs, dependent on an offshore foundry for IC fabrication. I feel this is an ideal arrangement, not only because the set-up and development of such a foundry requires substantial time and effort but also because it allows the researchers to focus of the circuit design and validation aspects based on a state-of-art GaN device fabrication technologies. The proposed work can significantly advance GaN IC design methodologies and potentially also can lead to value-added patentable design approaches and tools. In addition, the graduate students who will participate in this project can gain invaluable hands-on experience in GaN device and IC design, optimisation, characterization and verification.

Based on the background and experience of the PI and AI, I feel that they have the relevant training to execute the various tasks described in the proposal. While the public does not know many aspects of the prior industrial experience at Agilent/HP of the PI, his technical expertise clearly matches well with those required to perform successfully in this proposal. The AI also have many years of GaAs IC design experience and his participation in the beginning can greatly facilitate the set-up of the design, simulation and characterization facilities and training of graduate students. Also, the proposed collaborative partnership with Prof. Anthony Parker of Marquarie University in Sydney will definitely help the development GaN device models needed for the IC design and Prof. Parker has had a long experience in this area.

The proposed IC design work plans to explore several circuits in parallel and then to focus on one specific application for implementation and prototype demonstration. This down-selection process is fine but prioritising them earlier will save some time and forces the researchers to optimise their time usage.

The schedule detailed in the Timetable section of the proposal seems reasonable. My only recommendation here is to make sure the foundry is committed to a reasonable and reliable lot fabrication cycle time and to deliver the GaN ICs in a timely manner.

In summary, if successfully executed, the proposed GaN IC design work can greatly enhance the IC design skills in New Zealand and can foster formation of small business in this area.