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Commissioning of a Molecular Beam Epitaxy (MBE) system for III-V semiconductor growth

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Abstract content (Max 300 words) **Formatting & Special chars**

MBE is an advanced technique used for growing epitaxial structures to almost atomic layer precision which enables the development of various new material systems. MBE is already used in industry for advanced multilayer crystal growth and has led to radically new devices including high speed transistors, microwave devices, laser diodes and detectors. This enables multi-disciplinary research in a wide range of materials with new physics covering fields such as material science, photonics, and nano-electronics.

We hereby report on the commissioning of a new Riber Compact 21 Molecular Beam Epitaxy system in the Department of Physics, University of Pretoria. The system will allow the growth of III-V semiconductor materials GaAs, AlGaAs, InGaAs and their alloys with both n- and p-type doping (Si and Be respectively). The base pressure with liquid nitrogen in the cryopanel is 5×10^{-11} Torr. The system can process up to 3" inch wafers which can be annealed in the outgassing station to temperature up to 800 deg;C. The sample manipulator allows growth temperatures up to 1100 deg;C with continuous rotation and in situ RHEED analysis.

Preliminary results from initial calibration growths and test structures will be presented. The various growth capabilities of the system will further be discussed such as quantum well superstructures, nanorods, laser heterostructures, and HEMTs. A list of various projects that are planned and already underway will also be presented.

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NO

Level for award (Hons, MSc, PhD, N/A)?

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Yes

Primary author: Prof. THERON, Chris (University of Pretoria)

Co-authors: Mr JANSE VAN RENSBURG, Johan (University of Pretoria); Dr MEYER, Walter (University of Pretoria)

Presenter: Prof. THERON, Chris (University of Pretoria)

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