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## High resolution X-ray diffraction and photoluminescence of $\text{InAs}_{1-x}\text{Sb}_x/\text{GaSb}$

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**Abstract content**   
 &nbsp; (Max 300 words)   
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$\text{InAs}_{1-x}\text{Sb}_x$  has the lowest energy band gap among all the III-V semiconductors and has thus received a great deal of attention as an important material to be incorporated into infrared optoelectronic devices. Photodetectors containing this ternary have potential to reach wavelengths up to 9  $\mu\text{m}$ . To achieve this, high quality thin films with few defects and impurities are required. One of the key issues in using  $\text{InAs}_{1-x}\text{Sb}_x$  in the device architecture (particularly for wavelengths greater than 4  $\mu\text{m}$ ) is the lack of available lattice-matched substrates. To date, the best performing InAsSb-containing devices are lattice matched to GaSb substrates, with a 9% antimony solid content. (i.e.  $\text{InAs}_{0.91}\text{Sb}_{0.09}$ ).

This paper focuses on the deposition of high quality thin films of  $\text{InAs}_{0.91}\text{Sb}_{0.09}$  (between 2  $\mu\text{m}$  and 4  $\mu\text{m}$  thick) on 2" GaSb substrate. The material deposition is performed in a metal organic chemical vapour deposition (MOCVD) system. The process begins by the deposition of a thin (nanometer thickness range) low temperature buffer layer of either GaSb followed by the deposition of strain free InAsSb. High resolution X-ray diffraction (HRXRD) is used to precisely determine the composition of the ternary alloy as well as to investigate the uniformity across the entire wafer. Photoluminescence (PL), using a Fourier-transform infrared (FTIR) spectrometer, is employed to further explore the material quality and purity. Preliminary measurements indicate consistent thickness and compositional uniformity of the InAsSb layers.

**Apply to be considered for a student award (Yes / No)?**

No

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

PhD

**Main supervisor (name and email) and his / her institution**

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**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

No

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Yes

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