Atomic Layer Deposition of Indium Nitride using Hexacoordinated In–N Bonded Precursors and NH_3 Plasma

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Indium nitride (InN) is interesting for high frequency electronics due to its high electron mobility, small effective electron mass and high electron saturation velocity.[1] However, the problematic deposition of InN films by conventional methods, such chemical vapour deposition (CVD), has prevented full exploration of InN based electronics. This is due to the low temperature tolerated by the InN crystal as it decomposes to In metal and N_2 gas at 500 °C.[2] Atomic layer deposition (ALD) is an promising alternative to CVD for low temperature deposition of InN. The most widely used In precursor, $In(Me)_3$, suffers from poor thermal stability, which leads to high amounts of carbon impurities and low growth rates. Here, we present our studies on three alternative hexacoordinated M–N bonded In precursors **1-3** (Figure 1) for ALD of InN films, that were recently used for ALD of In_2O_3[3,4], and show how these results were used to design and develop a new highly volatile and thermally stable In precursor.

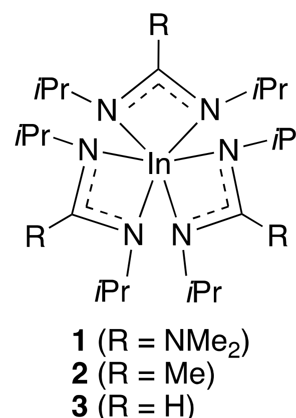

***Fig. 1:** Structure of In precursors **1-3** studied for InN ALD.*

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