Deposition of GaN Epitaxy Using $Ga(mDTC)_3$

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The tris(N, N-dimethyldithiocarbamato)-gallium(III) ($Ga(mDTC)_3$) was investigated in this study as a precursor material for gallium nitride thin film deposition. The $Ga(mDTC)_3$ was synthesized by reacting $Ga(NO_3)_3 \cdot xH_2O$ and sodium N, N-dimethyldithiocarbamate dihydrate (TCI) in methanol, followed by recrystallization in chloroform. The GaN thin film was deposited by hot-wall VPE technique, where TMGa, HCl and NH_3 were used as gas source precursors. The prepared $Ga(mDTC)_3$ precursor solution at fixed concentration was spin-coated on the cleaned substrate, and then the substrate was loaded into the Hot wall reactor for the growth of GaN thin film. The results showed that this method produces high-crystallinity GaN thin films at relatively lower deposition temperature. The optimal growth temperature was found to be 850 °C, and the optimal z-position was determined to be in the range of 12.5 to 15 cm.

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