

MOCVD-grown InGaAsN Using Efficient and Novel Precursor, Tertibutylhydrazine, for Optoelectronic Device Applications

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Currently, dimethylhydrazine (DMHy) has been commonly used as the nitrogen (N) source for InGaAsN growth by MOCVD. Generally speaking, a low-temperature growth and a much higher DMHy/AsH₃ flow rate ratio are necessary to incorporate enough N into InGaAs by MOCVD. However, incomplete pyrolysis of DMHy at low growth temperatures usually introduces carbon impurities from methyl-ligand in DMHy into InGaAsN epilayers, resulting in a higher background carrier concentration. In addition, a much higher DMHy flow is required to maintain a high flow rate ratio of DMHy/AsH₃ for InGaAsN growth, making DMHy not practical and economical for low-cost mass production, especially for high-efficiency quadruple-junction InGaAsN solar cells. Therefore, for the first time, we propose and demonstrate the feasibility of using tertiarybutylhydrazine (TBHy) as an efficient and a less carbon-containing N precursor for the growth of high-quality InGaAsN by MOCVD at lower growth temperatures. Based on our preliminary

results, TBHy is a more efficient and a less carbon-containing N precursor than DMHy for growth of high-quality InGaAsN. More details on performance of InGaAsN solar cells & laser diodes will be presented.