Interface Reaction Epitaxial (IRE) Growth and Double Buffer Layer (DBL) of AlN on Si using RF-MBE


- Interface reaction epitaxy (IRE) growth of β-Si₃N₄ and AlN DBL on Si substrate
- One-chamber growth system from a Si wafer to an GaN electron device using RF-MBE

**Objective**

- Photographic observation of a discharge orifice
- Low brightness (LB): Excitation (E)-mode. Excited molecules \( N_2^* \) SS-jet flux
- High brightness (HB): Dissociation (D)-mode. Dissociation to N atoms. Ground and excited state atoms \( (N + N^*) \) SS-jet flux

**Method**

1. rf ICP two discharge modes: LB mode and HB mode
2. Interface reaction epitaxy of \( \beta \)-Si₃N₄ and AlN using indirect exposure of N radicals and successive exposure of Al flux.
3. One-chamber growth of AlN on Si by PARF-MBE
4. Application for a lattice matching HEMT

**Results and Discussion**

1. Uniform growth \( \beta \)-Si₃N₄ on a 3" Si wafer
2. Wide range XRD pattern of AlN on Si by RF-MBE

**References**


**Conclusion**

In this presentation an interface reaction epitaxy (IRE) to grow of \( \beta \)-Si₃N₄ and AlN for a double buffer layer on Si. A new one-chamber growth system for group III nitrides on a Si wafer using RF-MBE system was demonstrated. Processes are followings:

1. Preparation of Si atomically flat and pure surface
2. IRE growth of \( \beta \)-Si₃N₄ using indirect exposure of N radical atoms
3. IRE growth of AlN by Al and of \( \beta \)-Si₃N₄ to prepare DBL
4. AM-MEE growth of an AlN template of DBL