【P-03】

Reactive ion etching of GaAs, AlGaAs, and InGaP in Cl_2 and CCl_2F_2 plasmas with Ar and H_2 addition

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We have investigated the reactive ion etching (RIE) of GaAs, AlGaAs, and InGaP in Cl2 and CCl_2F_2 plasmas with Ar and H_2 addition. Etching parameters (i.e., gas flow rate, RF power, and process pressure) were varied. GaAs substrate was used for this experiment. AlGaAs and InGaP layers lattice-matched to GaAs were grown by a compound source molecular beam epitaxy (MBE). For etch mask, a 3000Å-thick SiO_2 layer was used and patterned into 3-5㎛ stripes by using conventional photolithography and CF_4/O_2 RIE. The etching time was set to 10min and 5min for Cl_2 and CCl_2F_2, respectively. The etch rates were measured by a surface profiler. The etched profiles, sidewall roughness, and surface morphology were observed by a scanning electron microscopy (SEM). Figure 1 shows the etch rates of GaAs, AlGaAs, and InGaP and SiO_2 mask erosion rate as a function of Ar and H2 flow rate in $Cl_2/H_2/Ar$ plasma. Figure 2 shows SEM micrographs of the etched GaAs and InGaP in Cl_2(20sccm)/ H_2(20sccm)/Ar(5sccm) plasma at 160W and 30mTorr. The RIE of GaAs, AlGaAs, and InGaP was also investigated in CCl_2F_2 plasma with Ar and H_2 addition. Figure 3 shows SEM micrographs of the etched GaAs in CCl_2F_2(10sccm)/Ar(20sccm) plasma at 50W and 15mTorr.

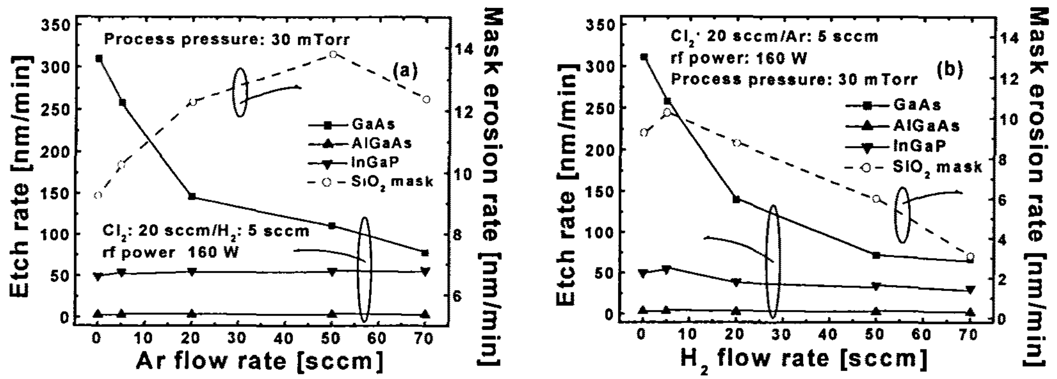

Fig. 1

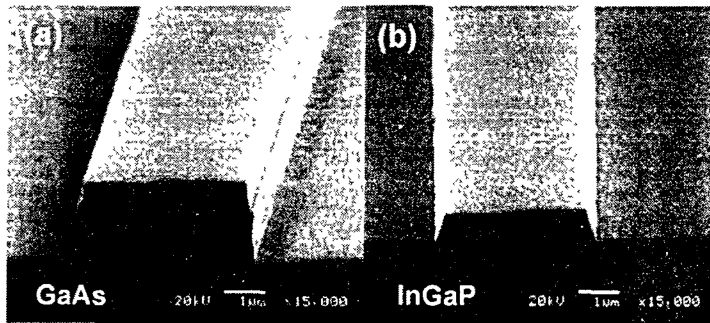

Fig. 2

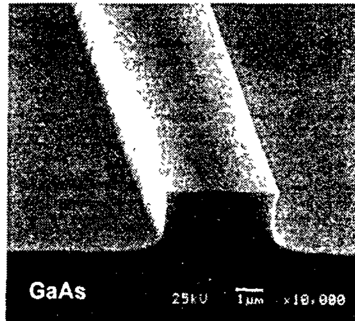

Fig. 3