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Effect of low temperature in nitriding of SiC using a remote M. SHIMABAYASHI, Hokkaido University, Japan, K. KURIHARA, Toshiba Corp., Japan, K. SASAKI, Hokkaido University, Japan — The surface nitriding of SiC using a remote nitrogen plasma is a candidate method for passivating the interface between the gate insulator and the channel region in a SiC-based power transistor. This work was motivated by the decrease in the weight density of the SiC surface by the irradiation of a remote nitrogen plasma. The decrease in the weight density is considered to be mainly due to desorption of C_2N_2 and HCN from the SiC surface during nitriding. In this work, we cooled the SiC sample below -100 °C to minimize the damage induced by the plasma irradiation. The sample which was irradiated by a remote nitrogen plasma for 1 minute showed the following effects of the sample cooling. 1) A deeper nitride layer was formed in the cooled sample, while the dislocation of the crystalline structure was milder. 2) The composition ratio of Si/C was roughly 1/1 in the region at a depth of > 1 nm in the cooled sample. A cooled sample which was irradiated for 3 minutes had a nitride layer without oxygen at a depth of > 1.6 nm. This structure is thought to be stable for the C-face of 4H-SiC. The irradiation of a remote nitrogen plasma to low-temperature SiC could work effectively for forming the passivation layer between the gate insulator and the channel region.

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