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Fabrication of a-ZnON films by Ar/N₂ sputtering for solid-phase crystallization of ZnO NAHO ITAGAKI, KAZUNARI KUWAHARA, KENTA NAKAHARA, DAISUKE YAMASHITA, KUNIHIRO KAMATAKI, GIICHIRO UCHIDA, KAZUNORI KOGA, MASAHARU SHIRATANI, Kyushu University — We propose a novel method for fabricating high crystallinity ZnO films via solid-phase crystallization (SPC) from amorphous phase films. As the amorphous phase films, we employ amorphous ZnON (a-ZnON) prepared by sputtering ZnO target in Ar/N₂, because we have difficulty in synthesizing amorphous ZnO films especially by sputtering. Optical emission spectroscopy suggests that the density of high energy electrons in the plasma, which dissociate N₂, increases with decreasing the total gas pressure. Therefore, incorporation of N in films disorders ZnO crystal structure and yields a-ZnON films at low gas pressure. SPC is realized by annealing such a-ZnON in oxidization atmosphere, since the dissociation energy of Zn-O is higher than that of Zn-N. The resultant ZnO films are highly orientated to (001) even on quartz glass substrates and have higher crystallinity than the films prepared by the conventional sputtering method.

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