In this work, nitrogen-doped ZnO (ZnO:N) thin films were prepared on glass substrates at ambient temperature by radio-frequency magnetron sputtering with 99.99% zinc oxide target. The working gas argon is mixed with the dopant gas nitrogen. During the deposition of ZnO:N thin films, an optical spectroscope was used to monitor in situ the plasma emission intensity from the nitrogen atom. We found that there are two stable emission intensity (state A and state B) when the volume ratio of nitrogen and argon are fixed at the same level. To clarify the difference of the thin films fabricated at state A and state B, we investigated the optical and electrical properties of these deposited films. The optical transmittance in the range 300 to 1000 nm show that the thin films deposited at state A is higher than the thin films deposited at state B. The electrical transport properties of deposited films were studied by a Hall measurement system. The results exhibit that both the ZnO:N thin films deposited at state A and state B are n-type conductivity. However, the resistivity of thin films sputtered at state B about 1 order of magnitude lower than the thin films sputtered at state A.

Keywords: rf magnetron sputtering, nitrogen-doped ZnO, thin film, optical emission spectral

REFERENCES