

Effects of Substrate Materials on Optical Behavior of ZnO:Al Film Prepared by RF-sputtering

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Aluminum-doped ZnO (ZnO:Al) film was deposited by RF-sputtering on different substrates (glass, B-PTFE and W-PTFE). From SEM photographs, the thickness of sputtered ZnO:Al films was about 90 nm. XRD measurements confirm that sputtered ZnO:Al films show ZnO:Al phase in (002) direction. Peak intensity of ZnO:Al phase obviously depends on the type of substrate materials. The highest and lowest peak intensities were observed on the films deposited on glass and B-PTFE substrates, respectively. AFM result reveals that surface roughness of the films on glass substrate shows the lowest value and on W-PTFE substrate shows the highest value. Electrical resistance of the film on glass is about 27Ω while on B-PTFE and W-PTFE substrates are the same value of about 26Ω . The average optical transmission in visible region of the film on glass, B-PTFE and W-PTFE substrates is 80, 60 and 18%, respectively. However, the film on B-PTFE substrate reaches the maximum optical transmission of about 80% in the second near-infrared region. The results imply that the optical properties of sputtered ZnO:Al film can be changed by the type of substrate materials.

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