

Annealing atmosphere effect on the optical and electrical properties of AZO thin films and ZnO nanorods grown on AZO films by solution process

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Herein, we demonstrated the synthesis of highly transparent conductive Al-doped zinc oxide (AZO) films from sequential nucleation and growth following hydrothermal process. Then, the vertically-aligned zinc oxide nanorods (ZnO NRs) were grown on the as-fabricated AZO films and after making seed layer over AZO films by low-temperature solution process. The ZnO NRs were grown in high density over seeded substrates. The influence of annealing atmosphere on the optical and electrical properties of as-deposited AZO films and after growing ZnO NRs on AZO films were performed by annealing in air, hydrogen, oxygen, nitrogen and argon ambient. The results indicated that the resistivity and mobility are lowest for argon annealed samples, whereas, the carrier density is highest. The normalized PL peak intensity of argon annealed sample in visible region is highest due to enhancement in the surface defects.