

## The low temperature process design for Al doped ZnO film synthesis on polymer

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In past, indium tin oxide (ITO) was mainly used for transparent conducting films. But in these days, ZnO:Al (AZO) has been being substituted for ITO from the advantage that it is inexpensive and is easily etched in order to form fine electrode. Due to attractive merits of AZO, many papers have been reported, utilizing deposition methods such as spray pyrolysis, pulsed laser deposition, metal organic chemical vapor deposition, reactive evaporation and several sputtering techniques. AZO films deposited on polymer substrate have many merits compared with those of on glass substrate, such as lightweight, small volume and flexibility. But to deposit on polymer substrate, it is necessary to be relatively low temperature. In this study, to overcome the drawback, we investigated the electrical, optical, and structural properties of films deposited using ZnO:Al<sub>2</sub>O<sub>3</sub> target by reactive sputtering and Al & ZnO targets by co-sputtering. But in the case of the former, it is difficult to deposit on polymer substrate because it need high temperature process in compensation for Al preventing ZnO grain growth. But though the latter, we obtained the properties of films deposited at low temperature since the heat of formation of ZnO is very low. Therefore, we acquired the lowest of 1.2 mΩcm as well as the transmittance of above 84% by controlling working pressure. In addition, to develop the electrical property of Al doped ZnO (AZO) films, we controlled the amount of hydrogen in argon plasma induced crystallite size increasing. In this case, we obtained the minimum resistivity of 0.8 mΩcm and maximum transmittance of 88.1% by controlling hydrogen partial pressure.