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1 **Sol-gel derived Al-doped zinc oxide - reduced graphene oxide**
2 **nanocomposite thin films**

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7
8 **Abstract:**

9 Transparent conductive ZnO films doped with 0 - 6 mol% of Al³⁺ (or AZO films) and AZO-
10 rGO (rGO - reduced graphene oxide, ~ 0 – 0.5 g/L) nanocomposite films were deposited on
11 silica glass substrates by sol-gel multilayer spin-coating, with annealing at 250°C in vacuum.
12 The effects of the processing conditions on the structure, optical and electrical properties of
13 the AZO-rGO films, as well as the AZO thin films for comparison, were investigated by XRD,
14 Raman spectroscopy, TEM and SEM, UV-Vis-NIR spectroscopy, and with the four-point
15 probe and Hall effect measurements. Al³⁺ ions and rGO sheets existed in the composite films,
16 and both of more Al³⁺ amount and more rGO could result in worse crystallinity of ZnO. More
17 amount of rGO led to more rGO flakers existed in the surface of the AZO-rGO films.
18 Increasing Al-doping amount could not obviously affect the optical transmittances of the
19 AZO-rGO films, but lead to the UV absorption edge of the films slightly blue-shifted. Optical
20 transmittances of the AZO-rGO films decreased obviously with increasing the rGO ratio, but
21 slightly decreased with increasing the annealing time. The minimum sheet resistance R_□ could

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