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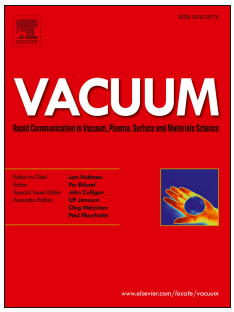


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# Effect of Lithium-ion doping concentration on structural and optical properties of NiO films fabricated by magnetron sputtering

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In the present work, we report the dependence of lithium-ion ($Li^+$) doping concentration on structure, optical and electrical properties of NiO films fabricated by radio frequency (rf) magnetron sputtering. It was found that the NiO grains were increased with increase in lithium-ion concentration from an anomalous state to a cubic shape following the NaCl-type structure. The NiO films presented highly c-axis preferred orientation with significant (111) diffraction. The samples marked A-C under the lithium-ion concentration of 1 at.%, 3 at.%, and 5 at.% respectively have optical band gap values of 3.72 eV, 3.61 eV and 3.47 eV, respectively. Comparatively, the controllable electrical properties of NiO films can be achieved by the variations of crystal quality arise from the lithium-ion doping concentration.

Recently, extensive attention has been paid to the Nickel oxide (NiO) films and devices because of its promising properties such as UV transparent conductivity, natural p-type semiconductor and low resistivity, which has been applied in the fields of UV detectors, gas sensors and heterojunction LEDs and LDs [1-5]. Moreover, the attractiveness of NiO as a p-type conducting material lies in the fact that the NiO films has excellent chemical stability and low cost compared to the high-quality p-type ZnO and GaN materials, which are difficult to achieve due to the less stability and high resistance [6-11]. In resent years, there are many methods on the fabrication of NiO films, which involves magnetron sputtering [12], sol-gel