NAZARBAYEV UNIVERSITY

NAZARBAYEV UNIVERSITY NATIONAL LABORATORY ASTANA

Institute of Batteries

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The 5th International Conference on Nanomaterials and Advanced Energy Storage Systems

ABSTRACT BOOK

The 4th Workshop on Water and Soil Clean-up from Mixed Contaminants

Energy storage

Advanced Nanomaterials

Alternative advanced energy

Catalysts and fuel cells

Modeling tools

Environment protection

9 - 11 August, 2017
Astana, Kazakhstan

Dear Colleagues!

We greatly appreciate your participation and valuable contribution to our Conference. We are honored and pleased to welcome you at INESS-2017 and hope that you will have enjoyable time in Astana, Kazakhstan!

The Organizers will put all efforts to make these days at INESS very efficient time to exchange and discuss the ideas, establish and strengthen collaboration in various fields of research. We hope that INESS will serve as an effective platform to establish new opportunities for joint works in science and education for sustainable development and the best future.

We will be looking forward to seeing you again.

Yours sincerely,

On behalf of the Organizers,

Prof. Zhumabay Bakenov

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Thermal Treatment of Aluminum Doped Zinc Oxide Thin Films

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Technical development is largely provided by studying of semiconductor materials and their application in electronics, telecommunications, optoelectronic devices and sensory devices[1-2]. Oxide semiconductors posses by different crystal structure and exhibit various electronic and optical properties, which provides a great potential for practical application, the possibility of realizing of new properties of these materials. Currently, transparent conductive oxide films (ZnO, SnO_2 and TiO_2) are a key component in various technologies, such as transparent electrodes for liquid crystal displays, solar cells, optical detectors, etc. [3-4].

It is known, that temperature treatment has a significant effect on various properties of the films, such as crystal quality, electrical behavior and photoluminescence[5]. The problem of studying the influence of the atmosphere and thermal treatment temperature on the electrical and optical properties of synthesized ZnO films is actual.

In this work, a low-cost sol-gel method for the synthesis of conductive transparent zinc oxide films doped with aluminum (AZO), which are promising for use as low-resistance conductive electrodes, has been worked out. Morphology, optical and electrical properties of AZO thin films, synthesized on glass substrates, with subsequent thermal treatment, were studied. It is shown that the synthesized AZO films are homogeneous and possess high optical transmission coefficient 70-80% in the visible range.

It is noted that the transmittance of AZO films, obtained by the sol-gel method, in the visible region decreases insignificantly at vacuum annealing. The band gap of the synthesized samples decreases with increasing annealing temperature in vacuum to 550°C from ~ 3.18 eV (from the original films) to ~ 3.02 eV.

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