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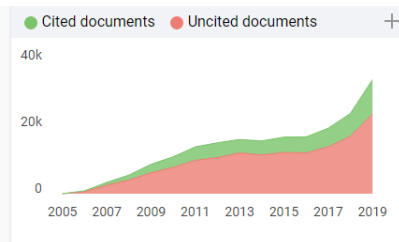
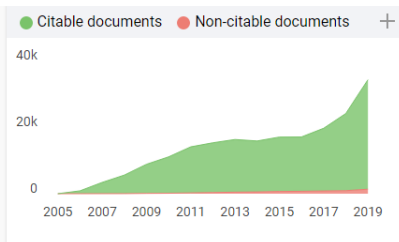
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2016	0	0
2017	5000	1000
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2019	0.45	0.45

% International Collaboration

Year	% International Collaboration
2005	20
2006	25
2007	30
2008	30
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The Effect of Indium Doped SnO₂ Thin Films on Optical Properties Prepared by Sol-Gel Spin Coating Technique

A. Doyan^{1,4*}, Susilawati^{5,6}, S. Hakim⁷, L. Mulyadi⁸, M. Taufik⁹ and Nazarudin⁷
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References

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Abstract

This study aims to investigate the optical properties of SnO₂ thin films doped with Indium synthesized using the sol-gel spin coating technique. The optical properties of thin films were measured using *Thermo Scientific GENESYS UV-Vis Spectrophotometer*. The results of characterization of optical properties showed that the thin films of Indium doped SnO₂ experienced an increase in transmittance from 75 - 96.6% at wavelengths 300 - 350 nm and increased maximum absorbance at a wavelength of


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The Effect of Indium Doped SnO₂ Thin Films on Optical Properties Prepared by Sol-Gel Spin Coating Technique

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Abstract. This study aims to investigate the optical properties of SnO₂ thin films doped with Indium synthesized using the sol-gel spin coating technique. The optical properties of thin films were measured using *Thermo Scientific GENESYS UV-Vis Spectrophotometer*. The results of characterization of optical properties showed that the thin films of Indium doped SnO₂ experienced an increase in transmittance from 75 - 96.6% at wavelengths 300 - 350 nm and increased maximum absorbance at a wavelength of 300 nm from 3.19 - 4.32 with an increase in doping percentage. This shows that thin films absorbance the maximum wave at a wavelength of 300 nm. Increasing the percentage of doping causes the thin films of SnO₂ to experience a decrease in energy gap both in the direct energy gap of 3.64 - 3.57 eV and indirect energy gap i.e from 3.92 - 3.87 eV. The optical activation energy of the SnO₂ thin films decreased with increasing doping percentage from 2.91 - 2.35 eV. The results of this study indicate that SnO₂: In thin films is high-quality because it has high transmittance and low energy gap.

1. Introduction

The study of semiconductor materials has a significant contribution to the development of technology. Semiconductor materials are widely used as electronic devices. One of the semiconductor materials is tin oxide. Semiconductor SnO₂ is an N-type semiconductor material. As a development, semiconductor materials can be modified to micro-size to nano-size in the form of a thin film. Energy gap SnO₂ thin films is 3.60 - 3.98 eV [1, 2], the energy gap value is large enough for thin films of semiconductor material.

Modification of semiconductor materials into thin films makes the use of semiconductor materials more diverse. Some uses of semiconductor materials in the form of thin films such as solar cells, touch screens [3], and gas sensors [4].

The function of SnO₂ thin films will be more optimal to be used as an electronic device that has high quality, so doping is needed which is expected to reduce the energy gap so that electronic devices become more sensitive. Some of the doped of SnO₂ thin films have been studied such as Fluoride Dehydrate [5], Aluminum [6], Aluminum-Zinc [7], Cesium [8], Fluorine [9], and Indium [10].



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The screenshot shows a Gmail interface with two emails from '6th ICRIEMS' (icriems@uny.ac.id) received on Saturday, June 15, 2019, at 19:04 and 19:10. Both emails are in Indonesian and concern a password reset request for the user 'Aris Doyan'. The emails contain a link to a password reset page: <http://seminar.uny.ac.id/icriems/user/reset/3968/1560596528/tJdKbqXW3pr...>. The first email also includes the text: 'This link can only be used once to log in and will lead you to a page where you can set your password. It expires after one day and nothing will happen if it's not used.'

The screenshot shows a Gmail interface with one email from 'ICRIEMS FMIPA UNY' (icriems@uny.ac.id) received on Sunday, June 1, 2019, at 13:47. The email is in Indonesian and is a 'Notification of Publication' regarding the publication process of IOP - Science. The text of the email reads: 'Dear Author(s) of 6th ICRIEMS 2019. On behalf of the 6th ICRIEMS FMIPA UNY, we would like to thank you for your participation in ICRIEMS 2019 that has been held in Yogyakarta, Indonesia on July 12-13, 2019. Enclosed please find a notification of publication letter about the publication process of IOP - Science. Thank you for your patience. We hope for your success in the future and be able to participate in the next ICRIEMS. Best Regards, ICRIEMS Committee'. At the bottom of the email, there is a note in Indonesian: 'Untuk mendukung "Gerakan UNY Hijau", disarankan tidak mencetak email ini dan lampirannya. (To support the "Green UNY movement", it is recommended not to print the contents of this email and its attachments) Universitas Negeri Yogyakarta www.uny.ac.id'. There is also a small logo at the bottom left of the email body.



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June 17, 2019

Author (s) :

Aris Doyan

Dear Author (s)

On behalf of the 6th ICRIEMS Committee, Faculty of Mathematics and Natural Science and I would like to thank you for submitting your **full paper** for ICRIEMS 2019 with the theme “Integrating Science, Technology, Engineering, & Mathematics (STEM) and Education for Disaster Risk Reduction and Mitigation” and will be held in Yogyakarta, Indonesia on July 12-13, 2019.

I am pleased to inform you that your initial **paper** entitled:
The Effect of Indium Doped SnO₂ Thin Films on Optical Properties Prepared by Sol-Gel Spin Coating Technique

is accepted to be presented. If the reviewer has requested any revision, it must be revised.

Thank you for participating in ICRIEMS 2019. Please read the following important information about your participation in the conference in website: <http://seminar.uny.ac.id/icriems/>. We hope that you are able to attend the conference, and look forward to seeing you in Yogyakarta.



Conference Chair,

ICRIEMS
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NIP. 197205221998021001