

Monotahun

LAPORAN AKHIR

PROGRAM HIBAH DOKTOR NON LEKTOR KEPALA



**PENGGUNAAN KITOSAN LIMBAH SISIK IKAN SEBAGAI  
COATING ASTM A36 DENGAN METODE  
ELECTROPHORETIC DEPOSITION (EPD)**

No. Kontrak 33/UN10.F07/PN/2020

PENGUSUL

**Dr. Femiana Gapsari MF, ST., MT**  
NIDN 0004078203

**Zainul Abidin, ST., MT., PhD.**  
NIDN 0023018602

**Dr. Putu Hadi Setyarini, ST., MT.**  
NIDN 0006087701

**UNIVERSITAS BRAWIJAYA**  
**NOPEMBER 2020**

HALAMAN PENGESAHAN

Judul : PENGGUNAAN KITOSAN LIMBAH SISIK IKAN SEBAGAI COATING ASTM A36 DENGAN METODE ELECTROPHORETIC DEPOSITION (EPD)

**Peneliti/Pelaksana**  
Nama Lengkap : Dr. FEMIANA GAPSARI MADHI FITRI, ST., MT.  
Perguruan Tinggi : Universitas Brawijaya  
NIDN : 0004078203  
Jabatan Fungsional : Lektor  
Program Studi : S1 Teknik Mesin  
Nomor HP : 082236441750  
Alamat surel (e-mail) : memi\_kencrut@ub.ac.id

**Anggota(1)**  
Nama Lengkap : ZAINUL ABIDIN, ST., MT., M.Eng., Ph.D  
NIDN : 0023018602  
Perguruan Tinggi : Universitas Brawijaya

**Anggota(2)**  
Nama Lengkap : Dr. PUTU HADI SETYARINI, ST., MT.  
NIDN : 0006087701  
Perguruan Tinggi : Universitas Brawijaya  
Tahun Pelaksanaan : Tahun ke 1 dari rencana 1 tahun  
Biaya Tahun Berjalan : Rp 25,000,000.00  
Biaya Keseluruhan : Rp 25,000,000.00

Mengetahui,

Malang, 04 November 2020

Dekan

Ketua Peneliti

Prof. Dr. Ir. Podojo Tri Juwono, MT., IPU

Dr. FEMIANA GAPSARI ST., MT.

NIDN. 0021077005

NIDN. 0004078203

Mengesetujui,

KEPALA LPM UB

Dr. H. M. HANG SUSILO, M.Sc. Agr.

NIDN. 0019076205

4. Efektifitas perlindungan dari kitosan sisik ikan pada berbagai jenis logam juga perlu diinvestigasi.

#### DAFTAR PUSTAKA

- Afandi, K. Y., Arief, I. S., Amiadji. 2015. *Analisa Laju Korosi pada Pelat Baja Karbon dengan Variasi Ketebalan Coating*. Jurnal Teknik ITS Vol. 4, No. 1, (2015) ISSN2337-3539 (2301-9271 Printed)
- Al-Otaibi, M. S., Al-Mayouf, A. M., Khan, M., Mousa, A. A., Al-Mazroa, S. A., Al-Khathlan, H. Z. 2012. *Corrosion Inhibitory Action of Some Plant Extracts on the Corrosion of Mild Steel in Acidic Media*. *Arabian Journal of Chemistry*. Peer review under responsibility of King Saud University. doi:10.1016/j.arabjc.2012.01.015.
- Batmanghelich F., Ghorbani, M., *Effect of pH and carbon nanotube content on the corrosion behavior of electrophoretically deposited chitosan-hydroxyapatite-carbon nanotube composite coatings*. *Ceram Int* 2013;39:5393-402.
- Besra, L., Liu, M. *A review on fundamentals and applications of electrophoretic deposition (EPD)*. *Progress in Materials Science* 52 (2007) 1-61.
- Finsgar, M., Jackson, J. 2014. *Application of Corrosion Inhibitor for Steels in Acidic Media for the Oil and Gas Industry: A Review*. *Corrosion Science* 86 (2014) 17-41.
- Gebhardt, F., Seuss, S., Turhan, M. C., Hornberger, H., Virtanen, S., Boccaccini, A. R. 2012. *Characterization of Electrophoretic Chitosan Coatings on Stainless Steel*. *Materials Letters* 66 (2012) 302-304.
- Li, L., Mahmoodian, M., li, C-Q., Robert, D. 2018. *Effect of Corrosion and Hydrogen Embrittlement on Microstructure and Properties of Mild Steel*. *Construction and Building Materials*. 170 (2018) 78-90.
- Mehdipour, M., Afshar, A., Mohebali, M. 2012. *Electrophoretic Deposition of Bioactive Glass Coating on 316L Stainless Steel and Electrochemical Behaviour Study*. *Applied Surface Science* 258 (2012) 9832-9839.

- Behdipour, M., and Afshar, A. 2012. *A Study of the Electrophoretic Deposition of Bioactive Glass-Chitosan Composite Coating*. *Ceramics International* 38 (2012) 471-476.
- Bradikhan F, Simchi A. *Long-term antibiotic delivery by chitosan-based composite coatings with bone regenerative potential*. *Appl Surf Sci* 2014;317:56-66.
- Hashbin, J., Simchi, F., Ryan A., Boccaccini, MP. *Electrophoretic deposition of chitosan/45S5 Bioglass® composite coatings for orthopaedic applications*. *Surf Coat Technol* (2011);205:5260
- Hashbin, J., Mourino, V., Gilchrist, JB, McComb, DW., Kreppel S., Salih, V. *Single-step electrochemical deposition of antimicrobial orthopaedic coatings based on a bioactive glass/chitosan/nano-silver composite system*. *Acta Biomater* (2013);9:7469-79
- Raja, P.B., Sethuraman, M.G. 2009. *Inhibition of corrosion of mild steel in sulphuric acid medium by Calotropis procera*. *Pigment & Resin Technology*, Vol. 38 Issue: 1, pp.33-37, <https://doi.org/10.1108/03699420910923553>.
- Rodriguez-Vazquez, M., Vega-Ruiz, B., Ramos-Zuniga, R.m Saldan-Koppel, D, A., Quinones-Olvera, L.F. 2015. *Chitosan and its potential use as a scaffold for tissue Engineering in Regeerative Medicine*. Hindawi publishing Corporation Research International. Vol. 2015, Article ID 821279, 15 pages. <http://dx.doi.org/10.1155/2015/821279>.
- Santana, I., Pepe, A., Schreiner, W., Pellice, S., Cere, S. 2016. *Hybrid Sol-Gel Coatings Containing Clay Nanoparticles for Corrosion Protection of Mild Steel*. *Electrochimia Acta*.S0013-4686(16)30241-9. <http://dx.doi.org/doi:10.1016/j.electacta.2016.01.214>.
- Senel, S., Mc Clure, S.J., 2004. *Potential Applications Of Chitosan In Veterinary Medicine*. *ADV Drug. Deliv. Rev.* 2004 Jun 23: 56 (10). 1467-80.
- Sharmin, H. K. 2012. *Gemini Surfactants: a new Class of Corrosion Inhibitors for brass In 3 N HNO<sub>3</sub> Solution*. Faculty of Engineering, Al-Jabal Al-Gharbi university, Zawra, Libya. Emerald Group Publishing Limited.
- Singh R. K., Kumar, R. 2018. *Corrosion Protection of Stainless Steel by Organic Inhibitors in Phosphate Industries in 15% H<sub>2</sub>SO<sub>4</sub>*. *Powder Metallurgy & Mining*. <http://dx.doi.org/10.4172/2168-9806.1000124>.
- Tracton, A.A., 2006. *Coatings Technology Hand Book*. Third Edition. CRC Press. Boca Raton.
- Trethewey, K. R. And J. Chamberlain. 1991. *Korosi Untuk Mahasiswa dan Rekayasawan*. Gramedia Pustaka Utama. Jakarta.
- Umoren, S. A., Eduok, U. M., Solomon, M. M., Udoh, A.P. 2011. *Corrosion Inhibition by Leaves and Stem Extracts of Sida acuta for Mild Steel in 1 M H<sub>2</sub>SO<sub>4</sub> Solutions Investigated by Chemical and Spectroscopic Techniques*. *Arabian Journal of Chemistry*. Doi:10.1016/j.arabjc.2011.03.008.
- Verma, C., Quraishi, M. A., Kluza, K., Makowska-Janusik, M., Lukman, O., Olasunkanmi, Ebenso, E. E. 2017. *Corrosion inhibition of mild steel in 1M HCl by D-glucose derivatives of dihydropyrido [2,3-d:6,5-d'] dipyrimidine-2, 4, 6, 8(1H,3H, 5H,7H)-tetraone*. *Scientific Reports*. DOI: 10.1038/srep44432.
- Wardani, L.A., & Harmami. 2014. *Optimasi Pelapisan ss 304 Dengan Kitosan Secara Electroforesis*. Skripsi Fakultas Matematika dan Ilmu Pengetahuan Ala. ITS. Surabaya.
- Wu, L., Zang, J., Hu, J., Zhang, J. 2012. *Improved Corrosion performance of electrophoretic coatings by silane addition*. *Corrosion Science* 56 (2012) 58-66.
- Xiao, H. T., Luo, M. N., Hung, L.B., Chiang, M.T., Lin, J.H., Lii, C.K., Huang, C.Y. 2012. *Effects Of Chitosan Oligosaccharides On Drug-Metabolizing Enzymes In Rat Liver And Kidneys*. *Food Chem Toxicol* 2012 May: 50 (5): 1171-7. Doi:10.1016/j.fct.2012.02.022. Epub 2012 Feb 22.
- Xiao, A. S., Khadom, A. A., Wael, R. K. 2013. *Apricot Juice as Green Corrosion Inhibitor of Mild Steel in Phosphoric Acid*. *Alexandria Engineering Journal*. (2013) 52, 129-135.



### PAPER ACCEPTANCE NOTIFICATION

Number : /VIII/ICOMERA2020/LoA

Date : October 6, 2020

First Author : Femiana Gapsari

Email : memi\_kencrut@ub.ac.id

Affiliation : Mechanical Engineering Department, Faculty of Engineering, Brawijaya University, MT Haryono 167 Malang,  
Indonesia 65145

Co-authors : Putu Hadi Setyarini, Syarif Hidayatullah, Yohanes D. Puraditya, Hastono Wijaya, Zainul Abidin

Paper Title : ASTM A36 Steel Corrosion Rate Control in 1M HCl using Electrophoretic Deposition (EPD) with Chitosan Coating

Paper ID : iCOMERA-Paper 245

Dear Femiana Gapsari

We are pleased to inform you that, after a careful double-blind peer-reviewing process, your manuscript is accepted for oral presentation at the International Conference on Mechanical Engineering Research and Application 2020 (ICOMERA 2020) to be held on 7 - 9th October 2020 in Malang, Indonesia.

To be eligible to publish on IOP Conference Series (Scopus Indexed), please submit your full paper using ICOMERA 2020 paper template (<https://proicomera.ub.ac.id/index.php/icomera/2/about/submissions#authorGuidelines>) and make revision as advised by our reviewer.

All selected papers will be published in International Journal of Integrated Engineering (IJIE) – UTHM (Scopus Indexed), Jurnal Daya Mesin (JRM) and International Journal of Mechanical Engineering Technologies and Applications (MECHTA) which is subjected to terms and conditions stipulated by editorial boards. The information regarding the papers published in IJIE, JRM, and MECHTA will be informed in separate letter.

After receiving this Letter of Acceptance (LoA), you need to:

1. Submit your full revised paper to iCOMERA's 2020 OCS system by visiting our website (<https://proicomera.ub.ac.id/index.php/icomera/2>) and follow the Online Revision Guidelines.
2. Notify iCOMERA 2020 committee about how you will do the presentation (preferably by asynchronous system via recorded presentation or by synchronous system via zoom on the day of conference). Please also send your recorded presentation no later than 11 September 2020 to [icomera.ub@gmail.com](mailto:icomera.ub@gmail.com) or [icomera@ub.ac.id](mailto:icomera@ub.ac.id)

Please note that Presenter MUST present their paper, otherwise, the paper will not be published.

If you have any questions concerning registration, conference program, and paper publication, please do not hesitate to contact by e-mail to [icomera.ub@gmail.com](mailto:icomera.ub@gmail.com) and [icomera@ub.ac.id](mailto:icomera@ub.ac.id) and [khairul.anam27@ub.ac.id](mailto:khairul.anam27@ub.ac.id) for OCS system. For the most updated information of the conference, kindly refer to the official conference website at <http://icomera.teknik.ub.ac.id>.

Thank you,

Yours sincerely,

Prof. B. Darmadi, PhD.

Chairman of ICOMERA 2020