

**DAFTAR PUSTAKA**

- Abitbol, T., Rivkin, A., Cao, Y., Nevo, Y., Abraham, E., Ben-shalom, T., Lapidot, S., Shoseyov, O., 2016. ScienceDirect Nanocellulose , a tiny fiber with huge applications 76–88.
- Anggraeni, R.D., Prasetya, A., Cahyono, B., 2018. Selectivity of Leaching From Kulonprogo ' s Lowgrade Manganese Ore with Organic Acid : Oxalic Acid , Acetic Acid and Citric Acid 1–7.
- Araki, J., Wada, M., Kuga, S., Okano, T., 1998. Low properties of microcrystalline cellulose suspension prepared by acid treatment of native cellulose. Colloids Surf. 142, 75–82.
- Bodin, A., Ahrenstedt, L., Fink, H., Brumer, H., Risberg, B., Gatenholm, P., 2007. Modification of Nanocellulose with a Xyloglucan–RGD Conjugate Enhances Adhesion and Proliferation of Endothelial Cells: Implications for Tissue Engineering. Biomacromolecules 8, 3697–3704. <https://doi.org/10.1021/bm070343q>
- Canon, W.F., 2014. What is Manganese? How is it Used? [WWW Document]. USGS Fact Sheet 2014-3087. URL <https://geology.com/usgs/manganese/> (accessed 1.5.20).
- CelluloseLab, 2020. 2020 Cellulose Lab Nanocellulose Products Price [WWW Document]. URL <https://www.celluloselab.com/price/CelluloseLab Product Price List 2020.htm> (accessed 1.27.20).
- Chirayil, C.J., Mathew, L., Thomas, S., 2014. Review of recent research in nano cellulose preparation from different lignocellulosic fibers. Rev. Adv. Mater. Sci. 37, 20–28. <https://doi.org/10.2991/icmemtc-16.2016.148>
- de Morais, T.E., Correa, A.C., Manzoli, A., F., de L., de Ribeiro, O.C., Mattoso, L.H.C., 2010. Cellulose nanofibers from white and naturally colored cotton fibers. Cellulose 17, 595–606.
- Dhar, N., 2010. Novel Cellulose Nanoparticles for Potential Cosmetic and Pharmaceutical Applications. University Press, Waterloo.
- Donald L. Klass, 1998. Biomass for Renewable Energy, Fuels, and Chemicals. Entech International, Inc., Barrington, Illinois, United States.
- Fan, H.Z.X., Zhang, X.Q.Q., 2014. A novel cleaning process for industrial production of xylose in pilot scale from corncob by using screw-steam-explosive extruder 2425–



- Fang-fang, W.U., Hong, Z., Shuai, W., Su-feng, L.A.I., 2014. Kinetics of reductive leaching of manganese oxide ore using cellulose as reductant 1763–1770. <https://doi.org/10.1007/s11771-014-2122-1>
- Favier, V., Canova, G.R., Cavaillé, J.Y., Chanzy, H., Dufresne, A., Gauthier, C., 1995. Nanocomposite materials from latex and cellulose whiskers. *Polym. Adv. Technol.* 6, 353–355.
- Fengel D and Wegner G, 1989. Wood-chemistry, Ultrastructure, Reactions. Walter de Gruyter, Berlin, New York.
- Fittipaldi, N., Pessoa, J., Feitosa, A., Miguel, F., Paulo, J., Morais, S., Karine, F., Sá, M. De, Souza, M. De, Freitas, M. De, 2017. Bacterial cellulose nanocrystals produced under different hydrolysis conditions : Properties and morphological features. *Carbohydr. Polym.* 155, 425–431. <https://doi.org/10.1016/j.carbpol.2016.08.090>
- Garvey, C., Parker, I., Simon, G., 2005. On the interpretation of X-ray diffraction powder patterns in terms of the nanostructure of cellulose I fibres. *Macromol Chem Phys* 206, 1568–1575.
- Gillespie, C., 2018. How Does Sonication Work? [WWW Document]. Sciencing. URL <https://sciening.com/sonication-work-5171302.html>
- Guo, J., Guo, X., Wang, S., Yin, Y., 2016. Effects of ultrasonic treatment during acid hydrolysis on the yield, particle size and structure of cellulose nanocrystals. *Carbohydr. Polym* 135, 248–255.
- H.P.S. Abdul Khalil, A.H. Bhat, A.F.I.Y., 2014. Influência da incorporação de celulose microfibrilada nas propriedades de resistência mecânicas do papel. *Sci. For. Sci.* 40, 345–351. <https://doi.org/10.1016/j.carbpol.2011.08.078>
- Habibi, Y., Lucia, L.A., Rojas, O.J., 2010. Cellulose Nanocrystals: Chemistry, Self-Assembly, and Applications. *Chem. Rev.* 110, 3479–3500. <https://doi.org/10.1021/cr900339w>
- Hariprasad, D., Dash, B., Ghosh, M.K., Anand, S., 2007. Leaching of manganese ores using sawdust as a reductant 20, 1293–1295. <https://doi.org/10.1016/j.mineng.2007.07.013>
- Hartati, I., Sediawan, W.B., Sulistyo, H., Azis, M.M., Mada, U.G., Hasyim, U.W., 2019. Mathematical Modelling and Simulation of Hydrotropic 13, 31–40. <https://doi.org/10.22146/jrekpros.42364>
- Hielscher, 2018. Probe-Type Sonication vs. Ultrasonic Bath: An Efficiency Comparison



- Ioelovich, M., 2017. Characterization of Various Kinds of Nanocellulose Handbook of Nanocellulose and Cellulose Nanocomposites. ResearchGate.  
<https://doi.org/10.1002/9783527689972.ch2>
- Ioelovich, M., 2014. Peculiarities of cellulose nanoparticles. Tappi J.
- Junior de Menezes, A., Siqueira, G., Curvelo, A.A.S., Dufresne, A., 2009. Extrusion and characterization of functionalized cellulose whiskers reinforced polyethylene nanocomposites. Polymer (Guildf). 50, 4552–4563.  
<https://doi.org/10.1016/j.polymer.2009.07.038>
- Kadla, J.F., Gilbert, R.D., 2000. Cellulose structure: A review, Cellulose Chemistry and Technology.
- Kargarzadeh, H., Ioelovich, M., Ahmad, I., Thomas, S., Dufresne, A., 2017. Methods for Extraction of Nanocellulose from Various Sources. Handb. Nanocellulose Cellul. Nanocomposites 1–49. <https://doi.org/10.1002/9783527689972.ch1>
- Koddenberg, T., 2016. Handbook of Wood Chemistry and Wood Composites, Journal of Cleaner Production. <https://doi.org/10.1016/j.jclepro.2015.07.070>
- Koppolu, R., Lahti, J., Abitbol, T., Swerin, A., Kuusipalo, J., Toivakka, M., 2019. Continuous Processing of Nanocellulose and Polylactic Acid into Multilayer Barrier Coatings. ACS Appl. Mater. Interfaces 11, 11920–11927.  
<https://doi.org/10.1021/acsami.9b00922>
- Laitinen, O., Kemppainen, K., Ämmälä, A., Sirviö, J.A., Liimatainen, H., Niinimäki, J., 2014. Use of Chemically Modified Nanocelluloses in Flotation of Hematite and Quartz. Ind. Eng. Chem. Res. 53, 20092–20098. <https://doi.org/10.1021/ie503415t>
- Lee, H.V., Hamid, S.B.A., Zain, S.K., 2014. Conversion of Lignocellulosic Biomass to Nanocellulose: Structure and Chemical Process. Sci. World J.
- Li, J., Wei, X., Wang, Q., Chen, J., Chang, G., Kong, L., Su, J., And Y, L., 2012. Homogeneous isolation of nanocellulose from sugarcane bagasse by high pressure homogenization. Carbohydr. Polym.
- Liu, Z., Xie, C., 2012. Preparation And Morphology Of Nanocrystalline Cellulose From Bamboo Pulp. Proc. 55th Int. Conv. Soc. Wood Sci. Technol. Beijing, China, 27-31 August 1–6.
- Lu, P., Hsieh, Y.L., 2010. Preparation and properties of cellulose nanocrystals: rods, spheres, and network. Carbohydr. Polym. 82, 329–336.



**CELLULOSE NANOCRYSTAL (CNC) DARI SELULOSA JERAMI PADI MELALUI HIDROLISIS ASAM SEBAGAI REDUCTANT PADA PELINDIAN PASIR YANG MENGANDUNG MANGAN**

HASAN RAHMAN M, Ir. Moh. Fahrurrozi, M.Sc., Ph.D. ; Prof. Ir. Wahyudi Budi Sediawan, SU., Ph.D.  
Universitas Gadjah Mada, 2020 | Diunduh dari <http://etd.repository.ugm.ac.id/>

Ludueña, L., Fasce, D., Alvarez, V.A., and Stefani, P.M., 2011. Nanocellulose from Rice

Husk Following Alkaline Treatment to Remove Silica. *BioResources* 6, 1440–1453.

Malvern Instruments, 2013. Records and Reports - Viewing the Results, in: Zetasizer Nanoseries User Manual. Malvern Instruments, Malvern, Worcestershire WR14 1XZ, pp. 4–9.

Mandal, A., Chakrabarty, D., 2011. Isolation of nanocellulose from waste sugarcane bagasse (SCB) and its characterization. *Carbohydr. Polym.* 86, 1291–1299. <https://doi.org/10.1016/j.carbpol.2011.06.030>

Miao, Q., Chen, L., Huang, L., Tian, C., Zheng, L., Ni, Y., 2014. A process for enhancing the accessibility and reactivity of hardwood kraft-based dissolving pulp for viscose rayon production by cellulase treatment. *Bioresour. Technol.* 154, 109–113. <https://doi.org/https://doi.org/10.1016/j.biortech.2013.12.040>

Moon, R.J., Martini, A., Nairn, J., Simonsen, J., Youngblood, J., 2011. Cellulose nanomaterials review: structure{,} properties and nanocomposites. *Chem. Soc. Rev.* 40, 3941–3994. <https://doi.org/10.1039/C0CS00108B>

Mtibe, A., Linganiso, L.Z., Mathew, A.P., Oksman, K., John, M.J., Anandjiwala, R.D., 2015. A comparative study on properties of micro and nanopapers produced from cellulose and cellulose nanofibres. *Carbohydr. Polym.* 118, 1–8. <https://doi.org/https://doi.org/10.1016/j.carbpol.2014.10.007>

Nakagaito, A.N., Nogi, M., Yano, H., 2010. Displays from Transparent Films of Natural Nanofibers. *MRS Bull.* 35, 214–218. <https://doi.org/DOI: 10.1557/mrs2010.654>

Nishiyama, Y., Langan, P., Chanzy, H., 2002. Crystal Structure and Hydrogen-Bonding System in Cellulose I $\beta$  from Synchrotron X-ray and Neutron Fiber Diffraction. *J. Am. Chem. Soc.* 124, 9074–9082. <https://doi.org/10.1021/ja0257319>

Park, S., Baker, J.O., Himmel, M.E., Parilla, P.A., Johnson, D.K., 2010. Cellulose crystallinity index : measurement techniques and their impact on interpreting cellulase performance. *Biotechnol. Biofuels* 1–10.

Pasquini, D., Teixeira, E.M., Curvelo, A.A.S., Belgacem, M.N., Dufresne, A., 2010. Extraction of cellulose whiskers from cassava bagasse and their applications as reinforced agent in natural rubber. *Ind. Crops Prod.* 32, 486–490.

Peng, B.L., Dhar, N., Liu, H.L., Tam, K.C., 2011. Chemistry and applications of nanocrystalline cellulose and its derivatives: A nanotechnology perspective. *Can. J. Chem. Eng.* 89, 1191–1206. <https://doi.org/10.1002/cjce.20554>

Ritter, S., 2015. A New Spin On Nanocellulose [WWW Document]. Concentrates. URL



- Rodriguez, N.L., Thielemans, W., Dufresne, and A., 2006. Sisal Cellulose Whiskers Reinforced Polyvinyl Acetate Nanocomposites. *Cellulose* 13, 261–270.
- Rosa, M.F., Medeiros, E.S., Malmonge, J.A., Gregorski, K.S., Wood, D.F., Mattoso, L.H.C., Glenn, G., Orts, W.J., and Imam, S.H., 2010. Cellulose Nanowhiskers from Coconut Husk Fibers Effect of Preparation Conditions on Their Thermal and Morphological Behavior. *Carbohydr. Polym.* 81, 83–92.
- Rusli, R., Eichhorn, S.J., 2008. Determination of the stiffness of cellulose nanowhiskers and the fiber-matrix interface in a nanocomposite using Raman spectroscopy. *Appl. Phys. Lett.* 93. <https://doi.org/10.1063/1.2963491>
- Salas, C., Nypelö, T., Rodriguez-Abreu, C., Carrillo, C., Rojas, O.J., 2014. Nanocellulose properties and applications in colloids and interfaces. *Curr. Opin. Colloid Interface Sci.* 19, 383–396. <https://doi.org/10.1016/j.cocis.2014.10.003>
- Sediawan, W.B., 2013. Hydrolysis of Polymer, in: Applications of Monte Carlo Simulation in Chemical Engineering. GADJAH MADA UNIVERSITY PRESS, Yogyakarta, pp. 183–187.
- Segal, L., Creely, J., Martin, A.J., 1962. An empirical method for estimating the degree of crystallinity of native cellulose using the x-ray diffractometer. *Tex Res J* 29, 786–794.
- Shrotri, A., Kobayashi, H., Fukuoka, A., 2017. Chapter Two - Catalytic Conversion of Structural Carbohydrates and Lignin to Chemicals. *Adv. Catal.* 60, 59–123.
- SNI, B.S.N., 2009. Pulp – Cara Uji Kadar Selulosa Alfa, Beta, dan Gamma 1–7.
- Svagan, A.J., Samir, M.A.S.A., Berglund, L.A., 2008. Biomimetic foams of high mechanical performance based on nanostructured cell walls reinforced by native cellulose nanofibrils. *Adv. Mater.* 20, 1263–1269. <https://doi.org/10.1002/adma.200701215>
- Tashiro, K., Kobayashi, M., 1991. Theoretical evaluation of three-dimensional elastic constants of native and regenerated celluloses: role of hydrogen bonds. *Polymer (Guildf).* 32, 1516–1526. [https://doi.org/https://doi.org/10.1016/0032-3861\(91\)90435-L](https://doi.org/https://doi.org/10.1016/0032-3861(91)90435-L)
- Thygesen, A., Oddershede, J., Lilholt, H., Thomsen, A., Stahl, K., 2005. On the determination of crystallinity and cellulose content in plant fibres. *Cellulose* 12, 563–576.
- Walther, A., Bjurhager, I., Malho, J.-M., Pere, J., Ruokolainen, J., Berglund, L.A., Ikkala,



UNIVERSITAS  
GADJAH MADA

**CELLULOSE NANOCRYSTAL (CNC) DARI SELULOSA JERAMI PADI MELALUI HIDROLISIS ASAM  
SEBAGAI REDUCTANT PADA  
PELINDIAN PASIR YANG MENGANDUNG MANGAN**

HASAN RAHMAN M, Ir. Moh. Fahrurrozi, M.Sc., Ph.D. ; Prof. Ir. Wahyudi Budi Sediawan, SU., Ph.D.

Universitas Gadjah Mada, 2020 | Diunduh dari <http://etd.repository.ugm.ac.id/>

O., 2010. Large-Area, Lightweight and Thick Biomimetic Composites with Superior Material Properties via Fast, Economic, and Green Pathways. *Nano Lett.* 10, 2742–2748. <https://doi.org/10.1021/nl1003224>

Zimmerman, T., Poehler, E., Geiger, T., 2004. Cellulose Fibrils for Polymer Reinforcement. *Adv. Eng. Mater.* 6, 754–761. <https://doi.org/10.1002/adem.200400097>