

DAFTAR PUSTAKA

- Abo-El-Enein, S., Eissa, M.A., Diafullah, A.A., Rizk, M.A., Mohamed, F., 2009. Removal of some heavy metals ions from wastewater by copolymer of iron and aluminum impregnated with active silica derived from rice husk ash. *Journal of hazardous materials* 172, 574–9. <https://doi.org/10.1016/j.jhazmat.2009.07.036>
- Ahmad, S., Aziz Mohamed, A., Abdullah, J., Yazid, H., Dahlan, M., Rasid, R., Abdullah, W.S.W., Mohamad, M., Jamro, R., Hamzah Harun, M., Mouad, A.T., Bin Mohamed, A.A., 2010. Application of Image And X-Ray Microtomography Technique To Quantify Filler Distribution In Thermoplastic-Natural Rubber Blend Composites. Presented at the NEUTRON AND X-RAY SCATTERING IN ADVANCING MATERIALS RESEARCH: Proceedings of the International Conference on Neutron and X-Ray Scattering—2009, Kuala Lumpur (Malaysia), pp. 139–145. <https://doi.org/10.1063/1.3295585>
- Ahmed, K., Nizami, S.S., Riza, N.Z., 2014. Reinforcement of natural rubber hybrid composites based on marble sludge/Silica and marble sludge/rice husk derived silica. *Journal of Advanced Research* 5, 165–173. <https://doi.org/10.1016/j.jare.2013.01.008>
- Akhtar, M., Velden, M., Al-Houqani, S.S.A., 2013. Investigation of Pre- and Post-Swelling Behavior of Elastomeric Material. *The Journal of Engineering Research [TJER]* 10, 65–79. <https://doi.org/10.24200/tjer.vol10iss1pp65-79>
- Al-Oweini, R., El-Rassy, H., 2009. Synthesis and characterization by FTIR spectroscopy of silica aerogels prepared using several Si(OR)₄ and R Si(OR)₃ precursors. *Journal of Molecular Structure* 919, 140–145. <https://doi.org/10.1016/j.molstruc.2008.08.025>
- Amin, M., Khattak, A., Ali, M., 2018. Influence of Silica (SiO₂) Loading on the Thermal and Swelling Properties of Hydrogenated-Nitrile-Butadiene-Rubber/Silica (HNBR/Silica) Composites. *Open Engineering* 8, 205–212. <https://doi.org/10.1515/eng-2018-0025>
- Anas Boussaa, S., Kheloufi, A., Boutarek Zaourar, N., Bouachma, S., 2017. Iron and Aluminium Removal from Algerian Silica Sand by Acid Leaching. *Acta Phys. Pol. A* 132, 1082–1086. <https://doi.org/10.12693/APhysPolA.132.1082>
- Armand, J.Y., Bourgois, J., Touchard, M., Vergnaud, J.M., 1986. Effect of sample size and heating rate on cure reaction of rubber in DSC. *Thermochimica Acta* 108, 345–356. [https://doi.org/10.1016/0040-6031\(86\)85103-6](https://doi.org/10.1016/0040-6031(86)85103-6)
- Arnorsson, S., 1975. Application of the silica geothermometer in low temperature hydrothermal areas in Iceland. *American Journal of Science* 275, 763–784. <https://doi.org/10.2475/ajs.275.7.763>
- Azmi, U., Sasongko, N.A., Murtiana, S., Yanto, S., Saputro, G.E., Laksmono, R., Supriyadi, I., 2024. A HOLISTIC OVERVIEW: INDONESIA'S GEOTHERMAL ENERGY ENCOURAGES GEOTHERMAL POWER PLANT INVESTMENT IN SUPPORT OF NATIONAL DEFENSE. *Jurnal Pertahanan dan Bela Negara* 14, 132–150. <https://doi.org/10.33172/jpbh.v14i2.19624>
- Bahrudin, Ahmad, A., Prayitno, A., Satoto, R., 2012. Morphology and Mechanical Properties of Palm Based Fly Ash Reinforced Dynamically Vulcanized Natural



- Rubber/Polypropylene Blends. *Procedia Chemistry* 4, 146–153.
<https://doi.org/10.1016/j.proche.2012.06.021>
- Barros, G.G.D., Ricardo, N.M.P., Vieira, V.W., 1992. Effect of iron oxides on the thermal degradation of natural rubber from *Manihot glaziovii*. *J. Appl. Polym. Sci.* 44, 1371–1376. <https://doi.org/10.1002/app.1992.070440808>
- Bharmoria, P., Gehlot, P.S., Gupta, H., Kumar, A., 2014. Temperature-Dependent Solubility Transition of Na₂SO₄ in Water and the Effect of NaCl Therein: Solution Structures and Salt Water Dynamics. *J. Phys. Chem. B* 118, 12734–12742. <https://doi.org/10.1021/jp507949h>
- Boonrasri, S., Thipchai, P., Sae-oui, P., Thanakkasarnee, S., Jantanasakulwong, K., Rachtanapun, P., 2023. Property Improvements of Silica-Filled Styrene Butadiene Rubber/Butadiene Rubber Blend Incorporated with Fatty-Acid-Containing Palm Oil. *Polymers* 15, 3429. <https://doi.org/10.3390/polym15163429>
- Boonstra, B.B., Medalia, A.I., 1963. Effect of Carbon Black Dispersion on the Mechanical Properties of Rubber Vulcanizates. *Rubber Chemistry and Technology* 36, 115–142. <https://doi.org/10.5254/1.3539530>
- Brinke, J.W. ten, 2002. *Silica reinforced tyre rubbers: mechanistic aspects of the role of coupling agents*. Twente Univ. Press, Enschede.
- Brydson, J.A., 1999. *Plastic Materials*, 7th ed. Butterworth-Heinemann, Oxford.
- Bueche, F., 1961. Mullins effect and rubber–filler interaction. *J. Appl. Polym. Sci.* 5, 271–281. <https://doi.org/10.1002/app.1961.070051504>
- Candelaria, N.R., Jr, A.C.C., Nogara, J.B., Reyes, R.L., Jordan, O.T., n.d. METHODS OF COPING WITH SILICA DEPOSITION - THE PNOX EXPERIENCE 13.
- Chapman, A.V., 1991. The Influence of Excess Zinc Stearate on the Chemistry of Sulphur Vulcanization of Natural Rubber. Phosphorus, Sulfur, and Silicon and the Related Elements 59, 271–274. <https://doi.org/10.1080/10426509108045740>
- Chenal, J.-M., Gauthier, C., Chazeau, L., Guy, L., Bomal, Y., 2007. Parameters governing strain induced crystallization in filled natural rubber. *Polymer* 48, 6893–6901. <https://doi.org/10.1016/j.polymer.2007.09.023>
- Chuayjuljit, S., IMVITTAYA, A., Na-Ranong, N., Potiyaraj, P., 2002. Effects of Particle Size and Amount of Carbon Black and Calcium Carbonate on Curing Characteristics and Dynamic Mechanical Properties of Natural Rubber. *Journal of Metals, Materials and Minerals* 12, 51–57.
- Ciesielski, Andrew., 1999. *An introduction to rubber technology*. Rapra Technology Ltd., Shawbury, Shrewsbury, Shropshire [Great Britain].
- Ciullo, P.A., 1996. *Industrial Minerals and Their Uses: A Handbook and Formulary*. William Andrew.
- Clemente, V.C., Alcober, E.H., de Guzman, R.C., Bayrante, L.F., 2016. Country update on geothermal utilization and barriers affecting its growth - Philippines, in: *The 11th Asian Geothermal Symposium*. Presented at the The 11th Asian Geothermal Symposium, Chiangmai, Thailand, pp. 1–6.
- Coran, A.Y., Donnet, J.-B., 1992a. The Dispersion of Carbon Black in Rubber Part II. The Kinetics of Dispersion in Natural Rubber. *Rubber Chemistry and Technology* 65, 998–1015. <https://doi.org/10.5254/1.3538656>
- Coran, A.Y., Donnet, J.-B., 1992b. The Dispersion of Carbon Black in Rubber Part I. Rapid Method for Assessing Quality of Dispersion. *Rubber Chemistry and Technology* 65, 973–997. <https://doi.org/10.5254/1.3538655>



- Dannenberg, E.M., 1986. Bound Rubber and Carbon Black Reinforcement. *Rubber Chemistry and Technology* 59, 512–524. <https://doi.org/10.5254/1.3538213>
- Deshmukh, P., Bhatt, J., Peshwe, D., Pathak, S., 2012. Determination of Silica Activity Index and XRD, SEM and EDS Studies of Amorphous SiO₂ Extracted from Rice Husk Ash. *Trans Indian Inst Met* 65, 63–70. <https://doi.org/10.1007/s12666-011-0071-z>
- Dick, J.S., Annicelli, R.A., 2001. *Rubber Technology: Compounding and Testing for Performance*. Hanser Publishers.
- Dluzneski, P.R., 2001. Peroxide Vulcanization of Elastomers. *Rubber Chemistry and Technology* 74, 451–492. <https://doi.org/10.5254/1.3547647>
- Dominic, M., Joseph, R., Joseph, D., Kumar, P.R.S., 2013. Synthesis, Characterization and Application of Rice Husk Nanosilica in Natural Rubber. *International Journal of Science, Environment* 2, 1027–1035.
- Donnet, J.-B., Custodero, E., 2013. Reinforcement of Elastomers by Particulate Fillers, in: *The Science and Technology of Rubber*. Elsevier, pp. 383–416. <https://doi.org/10.1016/B978-0-12-394584-6.00008-X>
- El-Tantawy, Prof.F., Deghaidy, F.S., 2000. Effect of iron oxide on vulcanization kinetics and electrical conductance of butyl rubber composites. *Polymer International* 49, 1371–1376. [https://doi.org/10.1002/1097-0126\(200011\)49:11<1371::AID-PI496>3.0.CO;2-0](https://doi.org/10.1002/1097-0126(200011)49:11<1371::AID-PI496>3.0.CO;2-0)
- Evonik GmbH, 2021. Precipitated Silica ULTRASIL-VN-3-GR [WWW Document]. URL <https://products-re.evonik.com/www2/uploads/productfinder/ULTRASIL-VN-3-GR-EN.pdf> (accessed 4.25.21).
- Faizal, F., Turnip, T.G., Mulyana, C., Joni, I.M., Panatarani, C., 2020. Dispersion of geothermal silica scaling by beads milling method, in: *AIP Conference Proceedings*. Presented at the 3rd International Conference on Condensed Matter and Applied Physics, AIP Publishing, Bikaner, India, p. 080014. <https://doi.org/10.1063/5.0003064>
- Frohlich, J., Niedermeier, W., Luginsland, H.-D., 2005. The effect of filler–filler and filler–elastomer interaction on rubber reinforcement. *Composites Part A: Applied Science and Manufacturing* 36, 449–460. <https://doi.org/10.1016/j.compositesa.2004.10.004>
- Gallup, D., 2002. Investigations of organic inhibitors for silica scale control in geothermal brines. *Geothermics* 31, 415–430. [https://doi.org/10.1016/S0375-6505\(02\)00004-4](https://doi.org/10.1016/S0375-6505(02)00004-4)
- Gao, M., Zheng, F., Xu, J., Zhang, S., Bhosale, S.S., Gu, J., Hong, R., 2019. Surface modification of nano-sized carbon black for reinforcement of rubber. *Nanotechnology Reviews* 8, 405–414. <https://doi.org/10.1515/ntrev-2019-0036>
- Gill, J.S., 1993. Inhibition of silica—silicate deposit in industrial waters. *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 74, 101–106. [https://doi.org/10.1016/0927-7757\(93\)80401-Y](https://doi.org/10.1016/0927-7757(93)80401-Y)
- Goerl, U., Hunsche, A., Mueller, A., Koban, H.G., 1997. Investigations into the Silica/Silane Reaction System. *Rubber Chemistry and Technology* 70, 608–623. <https://doi.org/10.5254/1.3538447>
- Grace Materials Tech, 2021. Precipitated Silica PERKASIL KS 408 PD [WWW Document]. URL <https://grace.com/plastics-and-rubber/en-us/Documents/PERKASIL%20Rubber%20Brochure.pdf> (accessed 4.25.21).



- Gudmundsson, S., Einarsson, E., 1989. Controlled silica precipitation in geothermal brine at the reykjanes geo-chemicals plant. *Geothermics* 18, 105–112. [https://doi.org/10.1016/0375-6505\(89\)90016-3](https://doi.org/10.1016/0375-6505(89)90016-3)
- Gulati, M., Maier, L.A., 2019. Occupational Interstitial Lung Disease, in: Reference Module in Biomedical Sciences. Elsevier, p. B978012801238311503X. <https://doi.org/10.1016/B978-0-12-801238-3.11503-X>
- Gundlach, N., Hentschke, R., 2018. Modelling Filler Dispersion in Elastomers: Relating Filler Morphology to Interface Free Energies via SAXS and TEM Simulation Studies. *Polymers* 10, 446. <https://doi.org/10.3390/polym10040446>
- Gunnarsson, I., Arnórsson, S., 2005. Treatment of Geothermal Waste Water to Prevent Silica Scaling, in: Proceedings World Geothermal Congress 2005. Antalya, Turkey, p. 5.
- Guo, J., Zeng, X., Li, H., Luo, Q., 2012. Effect of curatives and fillers on vulcanization, mechanical, heat aging, and dynamic properties of silicone rubber and fluororubber blends. *Journal of Elastomers & Plastics* 44, 145–164. <https://doi.org/10.1177/0095244311418440>
- Hajimohammadi, A., Provis, J.L., van Deventer, J.S.J., 2008. One-Part Geopolymer Mixes from Geothermal Silica and Sodium Aluminate. *Ind. Eng. Chem. Res.* 47, 9396–9405. <https://doi.org/10.1021/ie8006825>
- Han, I.-S., Chung, C.-B., Kang, S.-J., Kim, S.-J., Jung, H.-C., 1998. A kinetic model of reversion type cure for rubber compounds. *Polymer (Korea)* 22, 223–230.
- Harefa, J.C., Harmoko, U., 2021. Maksimalkan Potensi Geothermal dengan Pembentukan Holding BUMN Geothermal. *Jurnal Energi Baru dan Terbarukan* 2, 144–153. <https://doi.org/10.14710/jebt.2021.11074>
- Hasan, A., Rochmadi, R., Sulisty, H., Honggokusumo, S., 2018. The Effect of Ingredients Mixing Sequence in Rubber Compounding upon Vulcanization Kinetics of Natural Rubber: An Autocatalytic Model Study. *Indonesian Journal of Chemistry* 18, 709–717. <https://doi.org/10.22146/ijc.25707>
- Hasan, A., Rochmadi, R., Sulisty, H., Honggokusumo, S., 2013. Vulcanization Kinetics of Natural Rubber Based On Free Sulfur Determination. *Indones. J. Chem.* 13, 21–27. <https://doi.org/10.22146/ijc.21321>
- Heideman, G., Datta, R.N., Noordermeer, J.W.M., van Baarle, B., 2004. Activators in Accelerated Sulfur Vulcanization. *Rubber Chemistry and Technology* 77, 512–541. <https://doi.org/10.5254/1.3547834>
- Heideman, G., Noordermeer, J.W.M., Datta, R.N., van Baarle, B., 2006. Multifunctional Additives as Zinc-Free Curatives for Sulfur Vulcanization. *Rubber Chemistry and Technology* 79, 561–588. <https://doi.org/10.5254/1.3547952>
- Hess, W.M., Herd, C.R., Sebok, E.B., 1994. Microscopy of Carbon Black. *Kautschuk, Gummi, Kunststoffe: KGK; internationale Fachzeitschrift für polymere Werkstoffe; Organ: Deutsche Kautschuk-Gesellschaft e.V., Normenausschuß Kautschuktechnik im DIN 47*, 328–341.
- Hewitt, N., Ciullo, P., 2007. *Compounding Precipitated Silica in Elastomers: Theory and Practice*. Elsevier Science.
- Hildayati, Triwikantoro, Heny, F., Sudirman, 2009. Sintesis dan Karakterisasi Bahan Komposit Karet Alam-Silika, in: Peningkatan Kualitas Penelitian Dan Pendidikan Pascasarjana. Presented at the Seminar Nasional Pascasarjana IX, Institut Teknologi Sepuluh November, Surabaya, pp. 1–7.



- Hosseini, S.M., Razzaghi-Kashani, M., 2018. Catalytic and networking effects of carbon black on the kinetics and conversion of sulfur vulcanization in styrene butadiene rubber. *Soft Matter* 14, 9194–9208. <https://doi.org/10.1039/C8SM01953C>
- Hu, W., Ellul, M.D., Tsou, A.H., Datta, S., 2007. Filler Distribution and Domain Size of Elastomer Compounds by Solid-State NMR and AFM. *Rubber Chemistry and Technology* 80, 1–13. <https://doi.org/10.5254/1.3548166>
- Isayev, A.I., Deng, J.S., 1988. Nonisothermal Vulcanization of Rubber Compounds. *Rubber Chemistry and Technology* 61, 340–361. <https://doi.org/10.5254/1.3536192>
- Isayev, A.I., Sujan, B., 2006. Nonisothermal Vulcanization of Devulcanized GRT with Reversion Type Behavior. *Journal of Elastomers & Plastics* 38, 291–318. <https://doi.org/10.1177/0095244306067424>
- ISO 1817, 1999. Rubber, vulcanized — Determination of the effect of liquids.
- Iswar, S., Malfait, W.J., Balog, S., Winnefeld, F., Lattuada, M., Koebel, M.M., 2017. Effect of aging on silica aerogel properties. *Microporous and Mesoporous Materials* 241, 293–302. <https://doi.org/10.1016/j.micromeso.2016.11.037>
- Jenie, S.N.A., Ghaisani, A., Ningrum, Y.P., Kristiani, A., Aulia, F., Petrus, H.T.M.B., 2018. Preparation of silica nanoparticles from geothermal sludge via sol-gel method. *AIP Conference Proceedings* 2026, 020008. <https://doi.org/10.1063/1.5064968>
- Jin, J., Noordermeer, J.W.M., Dierkes, W.K., Blume, A., 2020. The Effect of Silanization Temperature and Time on the Marching Modulus of Silica-Filled Tire Tread Compounds. *Polymers* 12, 209. <https://doi.org/10.3390/polym12010209>
- Jin, J., Noordermeer, J.W.M., Dierkes, W.K., Blume, A., 2019. Key factors influencing marching modulus in silica-silane compounds. University of Twente.
- Kamal, M.R., Sourour, S., 1973. Kinetics and thermal characterization of thermoset cure. *Polym. Eng. Sci.* 13, 59–64. <https://doi.org/10.1002/pen.760130110>
- Karasek, L., Sumita, M., 1996. Characterization of dispersion state of filler and polymer-filler interactions in rubber-carbon black composites. *J Mater Sci* 31, 281–289. <https://doi.org/10.1007/BF01139141>
- Kauldhar, B.S., Yadav, S.K., 2018. Turning waste to wealth: A direct process for recovery of nano-silica and lignin from paddy straw agro-waste. *J. Clean. Prod.* 194, 158–166. <https://doi.org/10.1016/j.jclepro.2018.05.136>
- Kemenperin, 2015. Rencana Induk Pengembangan Industri Nasional 2015-2035.
- Kementerian ESDM RI, 2020. Rencana Strategis Kementerian ESDM 2020-2024.
- Khan, Ibrahim, Saeed, K., Khan, Idrees, 2017. Nanoparticles: Properties, applications and toxicities. *Arabian Journal of Chemistry* 24.
- Khodae, P., Najmoddin, N., Shahrads, S., 2018. The effect of ethanol and temperature on the structural properties of mesoporous silica synthesized by the sol-gel method, in: 2018 25th National and 3rd International Iranian Conference on Biomedical Engineering (ICBME). Presented at the 2018 25th National and 3rd International Iranian Conference on Biomedical Engineering (ICBME), IEEE, Qom, Iran, pp. 1–5. <https://doi.org/10.1109/ICBME.2018.8703594>
- Kim, D.Y., Park, J.W., Lee, D.Y., Seo, K.H., 2020. Correlation between the Crosslink Characteristics and Mechanical Properties of Natural Rubber Compound via Accelerators and Reinforcement. *Polymers* 12, 2020. <https://doi.org/10.3390/polym12092020>



- Kotani, M., Dohi, H., Kimura, H., Muraoka, K., Kaji, H., 2007. Characterization of Carbon Filler Distribution Ratio in Polyisoprene/Polybutadiene Rubber Blends by High-Resolution Solid-State ^{13}C NMR. *Macromolecules* 40, 9451–9454. <https://doi.org/10.1021/ma702104w>
- Kruželák, J., Sýkora, R., Hudec, I., 2015. Sulphur and peroxide vulcanisation of rubber compounds – overview. *Chemical Papers* 70, 1533–1555. <https://doi.org/10.1515/chempap-2016-0093>
- Kusumastuti, Y., Petrus, H.T.B.M., Yohana, F., Buwono, A.T., Zaqina, R.B., 2017. Synthesis and characterization of biocomposites based on chitosan and geothermal silica. Presented at the PROCEEDINGS FROM THE 14TH INTERNATIONAL SYMPOSIUM ON THERAPEUTIC ULTRASOUND, Las Vegas, Nevada, USA, p. 020127. <https://doi.org/10.1063/1.4978200>
- Kwang-Jea, K., James L, W., 2000. Breakdown of Silica Agglomerates and Other Particles during Mixing in an Internal Mixer and Their Processing Character. *J. Ind. Eng. Chem.* 6, 262–269.
- Labaj, I., Ondrušová, D., Vršková, J., Kohutiar, M., 2020. The effect of various alternative filler granularity on the properties of elastomeric vulcanizate. *IOP Conf. Ser.: Mater. Sci. Eng.* 776, 012098. <https://doi.org/10.1088/1757-899X/776/1/012098>
- Lazareva, S., Shikina, N., Tatarova, L.E., Ismagilov, Z., 2017. Synthesis of High-Purity Silica Nanoparticles by Sol-Gel Method. *Eurasian Chemico-Technological Journal* 19, 295. <https://doi.org/10.18321/ectj677>
- Lazaro, A., van de Griend, M.C., Brouwers, H.J.H., Geus, J.W., 2013. The influence of process conditions and Ostwald ripening on the specific surface area of olivine nano-silica. *Micropor. Mesopor. Mat.* 181, 254–261. <https://doi.org/10.1016/j.micromeso.2013.08.006>
- Le, V.H., Thuc, C.N.H., Thuc, H.H., 2013. Synthesis of silica nanoparticles from Vietnamese rice husk by sol-gel method. *Nanoscale Res Lett* 8, 58. <https://doi.org/10.1186/1556-276X-8-58>
- Leblanc, J.L., 2002. Rubber–filler interactions and rheological properties in filled compounds. *Prog. Polym. Sci.* 27, 627–687. [https://doi.org/10.1016/S0079-6700\(01\)00040-5](https://doi.org/10.1016/S0079-6700(01)00040-5)
- Leroy, E., Souid, A., Deterre, R., 2013a. A continuous kinetic model of rubber vulcanization predicting induction and reversion. *Polymer Testing* 32, 575–582. <https://doi.org/10.1016/j.polymertesting.2013.01.003>
- Leroy, E., Souid, A., Sarda, A., Deterre, R., 2013b. A knowledge based approach for elastomer cure kinetic parameters estimation. *Polymer Testing* 32, 9–14. <https://doi.org/10.1016/j.polymertesting.2012.08.012>
- Limper, A., 2012. *Mixing of rubber compounds*. Hanser Publishers ; Hanser Publications, Munich : Cincinnati, Ohio.
- Lowe, B.M., Skylaris, C.-K., Green, N.G., 2015. Acid-base dissociation mechanisms and energetics at the silica–water interface: An activationless process. *Journal of Colloid and Interface Science* 451, 231–244. <https://doi.org/10.1016/j.jcis.2015.01.094>
- Lu, X.R., Wang, H.M., Wang, S.J., 2015. Effect of swelling nitrile rubber in cyclohexane on its ageing, friction and wear characteristics. *Wear* 328–329, 414–421. <https://doi.org/10.1016/j.wear.2015.03.016>



- Luftinor, 2015. Penggunaan karet alam untuk pembuatan rubber cots mesin ring spinning. *Jurnal Dinamika Penelitian Industri* 26, 33–40. <https://doi.org/10.28959/jdpi.v26i1.699>
- Mahmud, K., Wang, M.-J., Belmont, J., Reznik, S., 1998. Silica Coated Carbon Blacks. WO1998013428A1.
- Makuuchi, K., 2000. Progress in radiation vulcanization of natural rubber latex. Presented at the JAERI-Conf-2000-003, Japan Atomic Energy Research Inst., Tokyo.
- Manaila, E., Craciun, G., Stelescu, M.-D., Ighigeanu, D., Ficai, M., 2014. Radiation vulcanization of natural rubber with polyfunctional monomers. *Polymer Bulletin* 71, 57–82. <https://doi.org/10.1007/s00289-013-1045-6>
- Manchanda, C.K., Khaiwal, R., Mor, S., 2017. Application of sol–gel technique for preparation of nanosilica from coal powered thermal power plant fly ash. *J Sol-Gel Sci Technol* 83, 574–581. <https://doi.org/10.1007/s10971-017-4440-x>
- Mark, J.E., Erman, B., Roland, C.M. (Eds.), 2013. *The Science and Technology of Rubber*, in: *The Science and Technology of Rubber (Fourth Edition)*. Academic Press, Boston, p. iii. <https://doi.org/10.1016/B978-0-12-394584-6.00016-9>
- Marrone, M., Montanari, T., Busca, G., Conzatti, L., Costa, G., Castellano, M., Turturro, A., 2004. A Fourier Transform Infrared (FTIR) Study of the Reaction of Triethoxysilane (TES) and Bis[3-triethoxysilylpropyl]tetrasulfane (TESPT) with the Surface of Amorphous Silica. *J. Phys. Chem. B* 108, 3563–3572. <https://doi.org/10.1021/jp036148x>
- Martinez, C.S.B., 2016. *Novel Renewable Materials from Natural Rubber and Agro-Industrial Residues*. The Ohio State University.
- Masood, M., Haleem, N., Shakeel, I., Jamal, Y., 2020. Carbon dioxide conversion into the reaction intermediate sodium formate for the synthesis of formic acid. *Research on Chemical Intermediates* 46. <https://doi.org/10.1007/s11164-020-04255-z>
- Mathew, T., Datta, R.N., Dierkes, W.K., Noordermeer, J.W.M., van Ooij, W.J., 2008. Mechanistic Investigations of Surface Modification of Carbon Black and Silica by Plasma Polymerisation. *Plasma Chemistry and Plasma Processing* 28, 273–287. <https://doi.org/10.1007/s11090-008-9122-6>
- Milani, G., Leroy, E., Milani, F., Deterre, R., 2013. Mechanistic modeling of reversion phenomenon in sulphur cured natural rubber vulcanization kinetics. *Polym. Test.* 32, 1052–1063. <https://doi.org/10.1016/j.polymertesting.2013.06.002>
- Milani, G., Milani, F., 2017. Comprehensive kinetic numerical model for nr and high-cis poly-butadiene rubber blends. *Chemical Engineering Transactions* 57, 1495–1500. <https://doi.org/10.3303/CET1757250>
- Molahasani, N., 2015. Synthesis and Characterization of Folic Acid conjugated ZnO/ Silica Core-shell as Cancer Therapeutic and Imaging Agent. *Research journal of biotechnology*.
- Morgan, B., McGill, W.J., 2000. Benzothiazole-accelerated sulfur vulcanization. I. 2-Mercaptobenzothiazole as accelerator for 2,3-dimethyl-2-butene. *Journal of Applied Polymer Science* 76, 1377–1385. [https://doi.org/10.1002/\(SICI\)1097-4628\(20000531\)76:9<1377::AID-APP2>3.0.CO;2-A](https://doi.org/10.1002/(SICI)1097-4628(20000531)76:9<1377::AID-APP2>3.0.CO;2-A)
- Morozov, I.A., Solodko, V.N., Kurakin, A.Y., 2015. Quantitative study of filled rubber microstructure by optical and atomic force microscopy. *Polymer Testing* 44, 197–207. <https://doi.org/10.1016/j.polymertesting.2015.04.007>



- Morrison, N.J., Porter, M., 1984. Temperature Effects on the Stability of Intermediates and Crosslinks in Sulfur Vulcanization. *Rubber Chemistry and Technology* 57, 63–85. <https://doi.org/10.5254/1.3536002>
- Morton, M. (Ed.), 1999. *Rubber Technology*, 3rd ed. Springer Science & Business Media, Dordrecht. <https://doi.org/10.1007/978-1-4615-7823-9>
- Mostoni, S., Milana, P., Di Credico, B., D'Arienzo, M., Scotti, R., 2019. Zinc-Based Curing Activators: New Trends for Reducing Zinc Content in Rubber Vulcanization Process. *Catalysts* 9, 664. <https://doi.org/10.3390/catal9080664>
- Muljani, S., Setyawan, H., Wibawa, G., Altway, A., 2013. Pencucian dua tahap untuk preparasi silika dari lumpur panas bumi (geothermal sludge). *Jurnal Teknik Kimia* 7, 59–65.
- Murakami, K., 1972. Effect of Metals on Degradation of Vulcanized Natural Rubber: . *J. Jpn. Soc. Colour Mater.* 45, 2–9. <https://doi.org/10.4011/shikizai1937.45.2>
- Musi, S., Filipovi -Vincekovi, N., Sekovani, L., 2011. Precipitation of amorphous SiO₂ particles and their properties. *Braz. J. Chem. Eng.* 28, 89–94. <https://doi.org/10.1590/S0104-66322011000100011>
- Ngeow, Y.W., Chapman, A.V., Heng, J.Y.Y., Williams, D.R., Mathys, S., Hull, C.D., 2019a. CHARACTERIZATION OF SILICA MODIFIED WITH SILANES BY USING THERMOGRAVIMETRIC ANALYSIS COMBINED WITH INFRARED DETECTION. *Rubber Chemistry and Technology* 92, 237–262. <https://doi.org/10.5254/rct.18.82626>
- Ngeow, Y.W., Heng, J.Y.Y., Williams, D.R., Davies, R.T., Lawrence, K.M.E., Chapman, A.V., 2019b. TEM observation of silane coupling agent in silica-filled rubber tyre compound. *J Rubber Res* 22, 1–12. <https://doi.org/10.1007/s42464-019-00005-y>
- Ngothai, Y., Lane, D., Kuncoro, G., Yanagisawa, N., Rose, P., Pring, A., 2012. Effect of Geothermal Brine Properties on Silica Scaling in Enhanced Geothermal Systems. *GRC Transaction* 36, 871–881.
- NIIR Board of Consultants and Engineers, 2006. *The Complete Book on Rubber Processing and Compounding Technology*. Asia Pacific Business Press Inc., India.
- Noguera, C., Fritz, B., Clément, A., 2015. Precipitation mechanism of amorphous silica nanoparticles: A simulation approach. *Journal of Colloid and Interface Science* 448, 553–563. <https://doi.org/10.1016/j.jcis.2015.02.050>
- Nor Ain Zainal, Syamsul Rizal Abdul Shukor, Harjatul Azwana Ab. Wab, Khairunisak Abdul Razak, 2013. Study on the effect of synthesis parameters of silica nanoparticles entrapped with rifampicin. *Chemical Engineering Transactions* 11, 431–440. <https://doi.org/10.3303/ACOS1311044>
- Olvianas, M., Widiyatmoko, A., Petrus, H.T.B., 2017. IR Spectral Similarity Studies of Geothermal Silica Bentonite Based Geopolymer, in: *Green Construction and Engineering Education for Sustainable Future*. Presented at the AIP Conference Proceedings. <https://doi.org/10.1063/1.5003498>
- Ondrušová, D., Dom eková, S., Paj tášová, M., Dubec, A., Mi icová, Z., Pecušová, B., 2017. Alternative Filler Based on the Waste from Glass Production and Its Effect on the Rubber Properties. *Procedia Engineering* 177, 462–469. <https://doi.org/10.1016/j.proeng.2017.02.246>



- Pajonk, G.M., 1989. DRYING METHODS PRESERVING THE TEXTURAL PROPERTIES OF GELS. *J. Phys. Colloques* 24, C4-13-C4-22. <https://doi.org/10.1051/jphyscol:1989403>
- Patil, A.O., Coolbaugh, T.S., 2005. Elastomers: A Literature Review with Emphasis on Oil Resistance. *Rubber Chemistry and Technology* 78, 516–535. <https://doi.org/10.5254/1.3547894>
- Piletska, E., Yawer, H., Canfarotta, F., Moczko, E., Smolinska-Kempisty, K., Piletsky, S.S., Guerreiro, A., Whitcombe, M.J., Piletsky, S.A., 2017. Biomimetic Silica Nanoparticles Prepared by a Combination of Solid-Phase Imprinting and Ostwald Ripening. *Sci Rep* 7, 11537. <https://doi.org/10.1038/s41598-017-12007-0>
- Poikelispää, M., Das, A., Dierkes, W., Vuorinen, J., 2015. The effect of coupling agents on silicate-based nanofillers/carbon black dual filler systems on the properties of a natural rubber/butadiene rubber compound. *J. Elastom. Plast.* 47, 738–752. <https://doi.org/10.1177/0095244314538436>
- Polmanteer, K.E., Lentz, C.W., 1975. Reinforcement Studies—Effect of Silica Structure on Properties and Crosslink Density. *Rubber Chemistry and Technology* 48, 795–809. <https://doi.org/10.5254/1.3539687>
- PPG Industries Chemical, 2021. Precipitated Silica HiSilEZ160G [WWW Document]. URL <https://www.ppgsilica.com/getmedia/14a69456-fb0f-486a-bbe8-0b4f9a1bc1a9/HiSilEZ160G.pdf.aspx> (accessed 4.25.21).
- Puskas, J., Chiang, K., Barkakaty, B., 2014. Natural rubber (NR) biosynthesis: Perspectives from polymer chemistry. *Chemistry, Manufacture and Applications of Natural Rubber* 30–67. <https://doi.org/10.1533/9780857096913.1.30>
- Rakhmasari, K.D., Perdana, I., Agus, P., Pidhatika, B., 2019. Nanosilika dari Prekursor Silika Geotermal: Pengaruh Konsentrasi Surfaktan dan Dekomposisi Termal Pasa Sintesis, in: *Prosiding Seminar Nasional Teknik Kimia “Kejuangan.” Presented at the Pengembangan Teknologi Kimia untuk Pengolahan Sumber Daya Alam Indonesia, Jurusan Teknik Kimia, FTI, UPN “Veteran” Yogyakarta, Yogyakarta, pp. K7-1.*
- Ralph K. Iler, 1979. *The Chemistry of Silica: Solubility, Polymerization, Colloid and Surface Properties and Biochemistry of Silica.*
- Rauline, R., 1993. Copolymer rubber composition with silica filler, tires having a base of said composition and method of preparing same. US5227425.
- Ray, S., Bhowmick, A.K., Bandyopadhyay, S., 2003. Atomic Force Microscopy Studies on Morphology and Distribution of Surface Modified Silica and Clay Fillers in an Ethylene-Octene Copolymer Rubber. *Rubber Chemistry and Technology* 76, 1091–1105. <https://doi.org/10.5254/1.3547789>
- Ribeiro, G.D., Hiranobe, C.T., da Silva, J.F.R., Torres, G.B., Paim, L.L., Job, A.E., Cabrera, F.C., dos Santos, R.J., 2022. Physical-Mechanical Properties of Chartwell® Coupling Agent-Treated Calcium Carbonate and Silica-Reinforced Hybrid Natural Rubber Composites. *Crystals* 12, 1552. <https://doi.org/10.3390/cryst12111552>
- Riyanto, N., Sumardi, P., Perdana, I., 2013. Kinetika Pelarutan Silika Amorf dari Lumpur Panas Bumi Dieng. *Jurnal Rekayasa Proses* 6, 1–6. <https://doi.org/10.22146/jrekpros.2450>



- Royall, C.P., Donald, A.M., 2002. Surface Properties and Structural Collapse of Silica in Matte Water-Based Lacquers. *Langmuir* 18, 9519–9526. <https://doi.org/10.1021/la025776n>
- Sandoval, O.G.M., Orozco, A.E.L., Valenzuela, S., Trujillo, G.C.D., 2019. Modified amorphous silica from a geothermal central as a metal adsorption agent for the regeneration of wastewater. *Water Resour. Ind.* 21, 100–105. <https://doi.org/10.1016/j.wri.2018.100105>
- Sapkota, J., 2011. Influence of Clay Modification on Curing Kinetics of Natural Rubber Nanocomposites. <https://doi.org/10.13140/RG.2.2.22850.48322/1>
- Sarkawi, S.S., Dierkes, W.K., Noordermeer, J.W.M., 2015. Morphology of Silica-Reinforced Natural Rubber: The Effect of Silane Coupling Agent. *Rubber Chem. Technol.* 88, 359–372. <https://doi.org/10.5254/rct.15.86936>
- Sarkawi, S.S., Dierkes, W.K., Noordermeer, J.W.M., 2014. Elucidation of filler-to-filler and filler-to-rubber interactions in silica-reinforced natural rubber by TEM Network Visualization. *Eur. Polym. J.* 54, 118–127. <https://doi.org/10.1016/j.eurpolymj.2014.02.015>
- Sattayanurak, S., Noordermeer, J.W.M., Sahakaro, K., Kaewsakul, W., Dierkes, W.K., Blume, A., 2019. Silica-Reinforced Natural Rubber: Synergistic Effects by Addition of Small Amounts of Secondary Fillers to Silica-Reinforced Natural Rubber Tire Tread Compounds. *Adv. Mater. Sci. Eng.* 2019, 1–8. <https://doi.org/10.1155/2019/5891051>
- Schaal, S., Coran, A.Y., Mowdood, S.K., 2000. The Effects of Certain Recipe Ingredients and Mixing Sequence on the Rheology and Processability of Silica- and Carbon Black-Filled Tire Compounds. *Rubber Chem. Technol.* 73, 240–252. <https://doi.org/10.5254/1.3547588>
- Schlomach, J., Kind, M., 2004. Investigations on the semi-batch precipitation of silica. *Journal of Colloid and Interface Science* 277, 316–326. <https://doi.org/10.1016/j.jcis.2004.04.051>
- Schon, P., Dutta, S., Shirazi, M., Noordermeer, J., Julius Vancso, G., 2011. Quantitative mapping of surface elastic moduli in silica-reinforced rubbers and rubber blends across the length scales by AFM. *J Mater Sci* 46, 3507–3516. <https://doi.org/10.1007/s10853-011-5259-4>
- Sharafudeen, R., Al-Hashim, J., Al-Harbi, M., Al-Ajwad, A., Al-Waheed, A., 2017. Preparation and Characterization of Precipitated Silica using Sodium Silicate Prepared from Saudi Arabian Desert Sand. *Silicon* 9, 917–922. <https://doi.org/10.1007/s12633-016-9531-8>
- Sharifuddin, S.M., Sulaiman, M.A., Mohamed, J.J., Pabli, A.F.M., Chueangchayaphan, W., 2020. Influence of Vulcanization System on the Mechanical Properties of CCTO/ENR50 Composite. *IOP Conf. Ser.: Earth Environ. Sci.* 596, 012001. <https://doi.org/10.1088/1755-1315/596/1/012001>
- Sholeh, M., Rochmadi, R., Sulisty, H., Budhijanto, B., 2020. Synthesis of precipitated silica from bagasse ash as reinforcing filler in rubber. *IOP Conf. Ser.: Mater. Sci. Eng.* 778, 012012. <https://doi.org/10.1088/1757-899X/778/1/012012>
- Silviana, S., Sagala, E.A.P.P., Sari, S.E., Siagian, C.T.M., 2019. Preparation of mesoporous silica derived from geothermal silica as precursor with a surfactant of cetyltrimethylammonium bromide, in: *AIP Conference Proceedings*. Presented at



- the International Conference on Science and Applied Science (ICSAS) 2019, AIP Publishing, Surakarta, Indonesia, p. 020070. <https://doi.org/10.1063/1.5141683>
- Silviana, S., Sanyoto, G.J., Darmawan, A., Sutanto, H., 2020. Geothermal Silica Waste as Sustainable Amorphous Silica Source For The Synthesis Of Silica Xerogels. *RJC* 13, 1692–1700. <https://doi.org/10.31788/RJC.2020.1335701>
- Siyal, A., Ismail, L., Man, Z., Khairun Azizi, A., 2014. Effect of NaOH and Water Contents on Solidification of Sodium Silicate Free Geopolymer. *Applied Mechanics and Materials* 625, 3–6. <https://doi.org/10.4028/www.scientific.net/AMM.625.3>
- Solvay Silica, 2021. Precipitated Silica Zeosil 1165 MP [WWW Document]. URL <https://www.solvay.com/sites/g/files/srpend221/files/tridion/documents/TIRE%20SOLUTIONS%20FICHES.pdf> (accessed 4.25.21).
- Song, L., Li, Z., Chen, L., Zhou, H., Lu, A., Li, L., 2016. The effect of bound rubber on vulcanization kinetics in silica filled silicone rubber. *RSC Adv.* 6, 101470–101476. <https://doi.org/10.1039/C6RA20063J>
- Sosa, R.C., Parton, R.F., Neys, P.E., Lardinois, O., Jacobs, P.A., Rouxhet, P.G., 1996. Surface modification of carbon black by oxidation and its influence on the activity of immobilized catalase and iron-phthalocyanines. *Journal of Molecular Catalysis A: Chemical* 110, 141–151. [https://doi.org/10.1016/1381-1169\(96\)00197-5](https://doi.org/10.1016/1381-1169(96)00197-5)
- Spicer, P.T., Keller, W., Pratsinis, S.E., 1996. The Effect of Impeller Type on Floc Size and Structure during Shear-Induced Flocculation. *Journal of Colloid and Interface Science* 184, 112–122. <https://doi.org/10.1006/jcis.1996.0601>
- Sridharan, H., Guha, A., Bhattacharyya, S., Bhowmick, A.K., Mukhopadhyay, R., 2019. Effect of Silica Loading and Coupling Agent on Wear and Fatigue Properties of a Tread Compound. *Rubber Chemistry and Technology* 92, 326–349. <https://doi.org/10.5254/rct.18.81570>
- Sugita, H., Bando, Y., Nakamura, M., 1998. Removal of Silica from Geothermal Brine by Seeding Method Using Silica Gel. *J. Chem. Eng. Japan / JCEJ* 31, 150–152. <https://doi.org/10.1252/jcej.31.150>
- Surya, I., Sukeksi, L., Hayeemasae, N., 2018. Studies on cure index, swelling behaviour, tensile and thermooxidative properties of natural rubber compounds in the presence of alkanolamide. *IOP Conf. Ser.: Mater. Sci. Eng.* 309, 012060. <https://doi.org/10.1088/1757-899X/309/1/012060>
- Suryawanshi, C.N., Pakdel, P., Schaefer, D.W., 2003. Effect of drying on the structure and dispersion of precipitated silica. *J Appl Crystallogr* 36, 573–577. <https://doi.org/10.1107/S0021889803001729>
- Syabani, Muh.W., Fauziyyah, F.I., Mutiara, T., 2018. Pengaruh Penambahan Karet Reklamasi dari Limbah Outsole terhadap Sifat Fisis dan Sifat Thermal Produk Outsole Sepatu (Studi Kasus di CV. Carita Niaga). *JSTL* 10, 15–25. <https://doi.org/10.20885/jstl.vol10.iss1.art3>
- Syabani, Muh.W., Suwarno, Y., Agustian, M.F., 2019. Effect of UV Aging on Physical Properties of Vulcanized Rubber with the Addition of Reclaimed Rubber. *Logic : Jurnal Rancang Bangun dan Teknologi* 19, 155–161. <http://dx.doi.org/10.31940/logic.v19i3.1469>
- Sya'bani, Muh.W., Suwarno, Y., Agustian, M.F., Perdana, I., Rochmadi, 2020. Studies of geothermal silica as rubbers compounds reinforcing filler. Presented at the THE 5TH INTERNATIONAL CONFERENCE ON INDUSTRIAL, MECHANICAL,



- ELECTRICAL, AND CHEMICAL ENGINEERING 2019 (ICIMECE 2019), Surakarta, Indonesia, p. 030144. <https://doi.org/10.1063/5.0000730>
- Syabani, M.W., Amaliyana, I., Hermiyati, I., Supriyatna, Y.I., 2020. Silica from Geothermal Waste as Reinforcing Filler in Artificial Leather. *Key Eng. Mater.* 849, 77–83. <https://doi.org/10.4028/www.scientific.net/KEM.849.78>
- Tadros, T., 2013. Ostwald Ripening, in: *Encyclopedia of Colloid and Interface Science*. Springer, Berlin, Heidelberg.
- Tauban, M., 2016. Impact of Filler Morphology and Distribution on the Mechanical Properties of Filled Elastomers: theory and simulations. *Materials Science* 210.
- Thorhallsson, S., 2011. COMMON PROBLEMS FACED IN GEOTHERMAL GENERATION AND HOW TO DEAL WITH THEM.
- Tiwari, J.N., Tiwari, R.N., Kim, K.S., 2012. Zero-dimensional, one-dimensional, two-dimensional and three-dimensional nanostructured materials for advanced electrochemical energy devices. *Progress in Materials Science* 57, 80. <http://dx.doi.org/10.1016/j.pmatsci.2011.08.003>
- Tscheschel, A., Lacayo, J., Stoyan, D., 2005. Statistical characterization of TEM images of silica-filled rubber. *Journal Of Microscopy* 217, 75–82.
- Udaibah, W., Priyanto, A., 2017. Synthesis and Structure Characterization of SiO₂ from Petung Bamboo Leaf Ash (*Dendrocalamus asper* (Schult.f.) Backer ex Heyne). *J. Nat. Scien. & Math. Res.* 3, 215–220. <https://doi.org/10.21580/jnsmr.2017.3.1.1697>
- Ueda, A., Kato, K., Mogi, K., Mroczek, E., Thain, I.A., 2003. Silica removal from Mokai, New Zealand, geothermal brine by treatment with lime and a cationic precipitant. *Geothermics* 32, 47–61. [https://doi.org/10.1016/S0375-6505\(02\)00050-0](https://doi.org/10.1016/S0375-6505(02)00050-0)
- Van Miltenburg, J.C., Cuevas-Diarte, M.A., 1989. The influence of sample mass, heating rate and heat transfer coefficient on the form of DSC curves. *Thermochimica Acta* 156, 291–297. [https://doi.org/10.1016/0040-6031\(89\)87197-7](https://doi.org/10.1016/0040-6031(89)87197-7)
- Versloot, P., Haasnoot, J.G., Nieuwenhuizen, P.J., Reedijk, J., van Duin, M., Put, J., 1997. Sulfur Vulcanization of Simple Model Olefins, Part V: Double Bond Isomerization during Accelerated Sulfur Vulcanization as Studied by Model Olefins. *Rubber Chemistry and Technology* 70, 106–119. <https://doi.org/10.5254/1.3538411>
- Villarias, J.A., Yorro, M.L.H., Galvan, M.-I.K.N., Diaz, L.J.L., 2017. High Purity Silica Nanoparticles from Geothermal Waste Brine as Reinforcing Filler in Rubber Composite Material. *Mater. Sci. Forum* 894, 104–108. <https://doi.org/10.4028/www.scientific.net/MSF.894.104>
- Waddell, W.H., 2006. Silica, Amorphous, in: John Wiley & Sons, Inc. (Ed.), *Kirk-Othmer Encyclopedia of Chemical Technology*. John Wiley & Sons, Inc., Hoboken, NJ, USA, p. 0113151823010404.a01.pub2. <https://doi.org/10.1002/0471238961.0113151823010404.a01.pub2>
- Wagner, M.P., 1976. Reinforcing Silicas and Silicates. *Rubber Chemistry and Technology* 49, 703–774. <https://doi.org/10.5254/1.3534979>
- Wang, G., Harrison, I.R., 1994. Polymer melting: heating rate effects on DSC melting peaks. *Thermochimica Acta* 231, 203–213. [https://doi.org/10.1016/0040-6031\(94\)80023-5](https://doi.org/10.1016/0040-6031(94)80023-5)
- Wang, M., Zhu, J., Zhang, S., You, G., Wu, S., 2019. Influencing factors for vulcanization induction period of accelerator / natural rubber composites: Molecular simulation and experimental study. *Polymer Testing* 80, 106145. <https://doi.org/10.1016/j.polymertesting.2019.106145>



- Wolff, S., Wang, M.-J., Tan, E.-H., 1993. Filler-Elastomer Interactions. Part VII. Study on Bound Rubber. *Rubber Chemistry and Technology* 66, 163–177. <https://doi.org/10.5254/1.3538304>
- Yanagase, T., Suginoara, Y., Yanagase, K., 1970. The properties of scales and methods to prevent them. *Geothermics* 2, 1619–1623. [https://doi.org/10.1016/0375-6505\(70\)90486-4](https://doi.org/10.1016/0375-6505(70)90486-4)
- Yang, Q., Wang, L., Xiang, W., Zhou, J., Li, J., 2007. Grafting polymers onto carbon black surface by trapping polymer radicals. *Polymer* 48, 2866–2873. <https://doi.org/10.1016/j.polymer.2007.01.074>
- Yücel, S., Karakuzu, B., Terzio lu, P., Temel, T.M., 2016. Influence of Gel Aging Time on the Properties of Various Silica Aerogels Synthesized from Water Glass. *MSF* 866, 176–180. <https://doi.org/10.4028/www.scientific.net/MSF.866.176>
- Yuniari, A., Nurhajati, D.W., Dewi, I.R., Setyorini, I., 2016. Reologi, sifat aging, termal, dan swelling dari campuran EPDM/NR dengan bahan pengisi carbon black N220. *Majalah Kulit, Karet, dan Plastik* 32, 13–20. <https://doi.org/10.20543/mkcp.v32i1.905>
- Zarrouk, S.J., Woodhurst, B.C., Morris, C., 2014. Silica scaling in geothermal heat exchangers and its impact on pressure drop and performance: Wairakei binary plant, New Zealand. *Geothermics* 51, 445–459. <https://doi.org/10.1016/j.geothermics.2014.03.005>
- Zielska, M., Seyger, R., Dierkes, W.K., Bielinski, D., Noordermeer, J.W.M., 2016. Swelling of EPDM rubbers for oil-well applications as influenced by medium composition and temperature 12.
- Zulkifli, N.S.C., Ab Rahman, I., Mohamad, D., Husein, A., 2013. A green sol–gel route for the synthesis of structurally controlled silica particles from rice husk for dental composite filler. *Ceramics International* 39, 4559–4567. <https://doi.org/10.1016/j.ceramint.2012.11.052>