References

Abdi, M. R., Askarian, A., and Safdari Seh Gonbad, M. (2020). Effects of sodium and calcium sulphates on volume stability and strength of lime-stabilized kaolinite. *Bulletin of Engineering Geology and the Environment*, 79(2):941–957.

Abdullah, H. H., Shahin, M. A., and Sarker, P. (2017). Stabilisation of clay with fly-ash geopolymer incorporating ggbfs. In *Proceedings of the second proceedings of the second world congress on civil, structural and environmental engineering (CSEE'17)*, pages 1–8.

Abhijith, L., Joy, J., Nair, G. S., Johnson, J., and Joesph, A. (2019). Strength behavior of lateritic soil treated with alccofine. *Int. J. Eng. Adv. Technol.*, 9:1995.

Abiodun, A. A. and Nalbantoglu, Z. (2022). Effect of ionic solutions on the performance of electrokinetic treatment of soft soils. *European Journal of Environmental and Civil Engineering*, 26(7):2704–2721.

Acar, Y. B. and Alshawabkeh, A. N. (1993). Principles of electrokinetic remediation. *Environmental science & technology*, 27(13):2638–2647.

Adlin Rose, R., Preethi Jain, B., Ramya, D., and Nilaa, M. (2021). Performance of contaminated soil blended with sodium silicate. *Silicon*, 13(2):599–603.

Ahenkorah, I., Rahman, M. M., Karim, M. R., Beecham, S., and Saint, C. (2021). A review of enzyme induced carbonate precipitation (eicp): The role of enzyme kinetics. *Sustainable Chemistry*, 2(1):92–114.

Al-Khafaji, R., Jafer, H., Dulaimi, A., Atherton, W., and Weida, Z. (2017). Soft soil stabilisation using ground granulated blast furnace slag. In *The 3rd BUiD Doctoral Research Conference, At British University in Dubai.*

Al Mosawe, M. and Al Zuhairi, A. (2002). The use of sand columns to improve soft soil. In *Proc. 2nd Minia International Conference for Advanced Trends in Engineering*. MICATE Minia, Egypt.

Al-Rkaby, A. H. J. (2019). Evaluating shear strength of sand-ggbfs based geopolymer composite material. *Acta Polytechnica*, 59(4):305–311.

Al Saudi, N. K., Al-Gharbawi, A. S., Rajab, N. A., and Tanyrbergenova, G. (2016). Sand and stone columns in soft soil at different relative densities. *Japanese Geotechnical Society Special Publication*, 2(62):2121–2126.

Almajed, A., Abbas, H., Arab, M., Alsabhan, A., Hamid, W., and Al-Salloum, Y. (2020). Enzyme-induced carbonate precipitation (eicp)-based methods for ecofriendly stabilization of different types of natural sands. *Journal of Cleaner Production*, 274:122627.

Almajed, A., Khodadadi Tirkolaei, H., and Kavazanjian Jr, E. (2018). Baseline investigation on enzyme-induced calcium carbonate precipitation. *Journal of Geotechnical and Geoenvironmental Engineering*, 144(11):04018081.

Almajed, A., Tirkolaei, H. K., Kavazanjian, E., and Hamdan, N. (2019). Enzyme induced biocementated sand with high strength at low carbonate content. *Scientific reports*, 9(1):1–7.

Alshawabkeh, A. N. and Bricka, R. M. (2000). Basics and applications of electrokinetic remediation. In *Remediation engineering of contaminated soils*, pages 95–111. CRC Press.

Awang, A. R., Marto, A., and Makhtar, A. M. (2011). Geotechnical properties of tanjung bin coal ash mixtures for backfill materials in embankment construction. *Ejge*, 16:1515–1531.

Azhar, A., Jefferson, I., Madun, A., Abidin, M., and Rogers, C. (2018). Electrokinetic stabilisation method of soft clay in pure system using electrokinetic geosynthetic electrode. In *Journal of Physics: Conference Series*, volume 995, page 012109. IOP Publishing.

Azzam, R. and Oey, W. (2001). The utilization of electrokinetics in geotechnical and environmental engineering. *Transport in Porous Media*, 42(3):293–314.

Azzam, W. and Basha, A. (2017). Utilization of soil nailing technique to increase shear strength of cohesive soil and reduce settlement. *Journal of Rock Mechanics and Geotechnical Engineering*, 9(6):1104–1111.

Barker, J., Rogers, C., Boardman, D., and Peterson, J. (2004). Electrokinetic stabilisation: an overview and case study. *Proceedings of the Institution of Civil Engineers-Ground Improvement*, 8(2):47–58.

Bauer, A. and Berger, G. (1998). Kaolinite and smectite dissolution rate in high molar koh solutions at 35 and 80 c. *Applied Geochemistry*, 13(7):905–916.

Bauer, A. and Velde, B. (1999). Smectite transformation in high molar koh solutions. *Clay Minerals*, 34(2):259–273.

Baveye, P., Vandevivere, P., Hoyle, B. L., DeLeo, P. C., and de Lozada, D. S. (1998). Environmental impact and mechanisms of the biological clogging of saturated soils and aquifer materials. *Critical reviews in environmental science and technology*, 28(2):123–191.

Bellum, R. R., Nerella, R., Madduru, S. R. C., and Indukuri, C. S. R. (2019). Mix design and mechanical properties of fly ash and ggbfs-synthesized alkali-activated concrete (aac). *Infrastructures*, 4(2):20.

Benayoun, F., Boumezerane, D., Bekkouche, S. R., and Ismail, F. (2021). Optimization of geometric parameters of soil nailing using response surface methodology. *Arabian Journal of Geosciences*, 14(19):1–14.

Bose, B. (2012). Geo engineering properties of expansive soil stabilized with fly ash. *Electronic Journal of Geotechnical Engineering*, 17(1):1339–1353.

Bourgès-Gastaud, S., Dolez, P., Blond, E., and Touze-Foltz, N. (2017). Dewatering of oil sands tailings with an electrokinetic geocomposite. *Minerals Engineering*, 100:177–186.

Brykov, A., Danilov, V., Korneev, V., and Larichkov, A. (2002). Effect of hydrated sodium silicates on cement paste hardening. *Russian journal of applied chemistry*, 75(10):1577–1579.

Cameselle, C., Gouveia, S., and Cabo, A. (2021). Enhanced electrokinetic remediation for the removal of heavy metals from contaminated soils. *Applied Sciences*, 11(4):1799.

Carmona, J. P., Oliveira, P. J. V., and Lemos, L. J. (2016). Biostabilization of a sandy soil using enzymatic calcium carbonate precipitation. *Procedia engineering*, 143:1301–1308.

Chandra, A. and Ravi, K. (2021). Application of enzyme-induced carbonate precipitation (eicp) to improve the shear strength of different type of soils. In *Problematic soils and geoenvironmental concerns*, pages 617–632. Springer.

Chavali, R. V. P., Vindula, S. K., Babu, A., Pillai, R. J., et al. (2017). Swelling behavior of kaolinitic clays contaminated with alkali solutions: a micro-level study. *Applied Clay Science*, 135:575–582.

Chien, S.-C., Ou, C.-Y., and Lee, Y.-C. (2010). A novel electroosmotic chemical treatment technique for soil improvement. *Applied clay science*, 50(4):481–492.

Chien, S.-C., Ou, C.-Y., and Wang, Y.-H. (2011). Soil improvement using electroosmosis with the injection of chemical solutions: laboratory tests. *Journal of the Chinese Institute of Engineers*, 34(7):863–875.

Choobbasti, A. J., Samakoosh, M. A., and Kutanaei, S. S. (2019). Mechanical properties soil stabilized with nano calcium carbonate and reinforced with carpet waste fibers. *Construction and Building Materials*, 211:1094–1104.

Christoulas, S., Bouckovalas, G., and Giannaros, C. (2000). An experimental study on model stone columns. *SOILS AND FOUNDATIONS*, 40(6):11–22.

Cong, M., Longzhu, C., and Bing, C. (2014). Analysis of strength development in soft clay stabilized with cement-based stabilizer. *Construction and Building Materials*, 71:354–362.

Corrêa-Silva, M., Miranda, T., Rouainia, M., Araújo, N., Glendinning, S., and Cristelo, N. (2020). Geomechanical behaviour of a soft soil stabilised with alkali-activated blast-furnace slags. *Journal of Cleaner Production*, 267:122017.

Cuadros, J. and Linares, J. (1996). Experimental kinetic study of the smectite-to-illite transformation. *Geochimica et Cosmochimica Acta*, 60(3):439–453.

Das, N., Kayastha, A. M., and Srivastava, P. K. (2002). Purification and characterization of urease from dehusked pigeonpea (cajanus cajan l.) seeds. *Phytochemistry*, 61(5):513–521.

DeJong, J. T., Mortensen, B. M., Martinez, B. C., and Nelson, D. C. (2010). Bio-mediated soil improvement. *Ecological Engineering*, 36(2):197–210.

Dev, S. and Sharma, N. (2017). Stabilization of expansive soil with marble dust and alccofine. *Int. J. Adv. Res. Sci. Eng.*, 6:1212–1219.

Dutta, R. K., Khatri, V. N., Thakur, V., and Das, P. P. (2019). Effect of alccofine addition on the index and engineering properties of bentonite. *J. Geotech. Eng.*, 6(1):9–17.

Dutta, R. K. and Yadav, J. S. (2021). The impact of alccofine inclusion on the engineering properties of bentonite. *Cleaner Engineering and Technology*, 5:100301.

Estabragh, A., Jahani, A., Javadi, A., and Babalar, M. (2022). Assessment of different agents for stabilisation of a clay soil. *International Journal of Pavement Engineering*, 23(2):160–170.

Estabragh, A., Naseh, M., and Javadi, A. (2014). Improvement of clay soil by electro-osmosis technique. *Applied Clay Science*, 95:32–36.

Fang, S., Huang, X., Zhang, P., Zhou, J., and Guo, N. (2017). Study on the unconfined compressive strength of electricity-modification silicification grouted loess. *Chemical Engineering Transactions*, 59:367–372.

Farouk, A. and Shahien, M. M. (2013). Ground improvement using soil–cement columns: Experimental investigation. *Alexandria Engineering Journal*, 52(4):733–740.

Firoozi, A. A., Taha, M. R., Firoozi, A. A., and Khan, T. A. (2015). The influence of freezeâ€“thaw cycles on unconfined compressive strength of clay soils treated with lime. *Jurnal Teknologi*, 76(1).

Frydman, S., Ravina, I., and Ehrenreich, T. (1978). Stabilization of heavy clay with potassium chloride. *Geotechnical Engineering*, 8(2).

Fu, H., Yuan, L., Wang, J., Cai, Y., Hu, X., and Geng, X. (2019). Influence of high voltage gradients on electrokinetic dewatering for wenzhou clay slurry improvement. *Soil Mechanics and Foundation Engineering*, 55(6):400–407.

Glendinning, S., Lamont-Black, J., and Jones, C. J. (2007). Treatment of sewage sludge using electrokinetic geosynthetics. *Journal of Hazardous Materials*, 139(3):491–499.

Gobinath, R., Akinwumi, I. I., Afolayan, O. D., Karthikeyan, S., Manojkumar, M., Gowtham, S., and Manikandan, A. (2020). Banana fibre-reinforcement of a soil stabilized with sodium silicate. *Silicon*, 12(2):357–363.

Godayal, A., Kapoor, A., and Garg, P. (2018). Effect of alccofine, lime on geotechnical properties of cohesive soil. *Int. J. Creative Res. Thoughts (IJCRT)*, 6(2).

Gratchev, I. and Towhata, I. (2011). Compressibility of natural soils subjected to long-term acidic contamination. *Environmental Earth Sciences*, 64(1):193–200.

Gratchev, I. B. and Sassa, K. (2009). Cyclic behavior of fine-grained soils at different ph values. *Journal of geotechnical and geoenvironmental engineering*, 135(2):271–279.

Guetif, Z., Bouassida, M., and Debats, J. (2007). Improved soft clay characteristics due to stone column installation. *Computers and Geotechnics*, 34(2):104–111.

Gupta, S., Sharma, D. S., and Sharma, D. D. (2013). A review on alccofine, a supplementary cementitous material. *International Journal of Modern Trends in Engineering and Research*, 3(2):148–153.

Han, S., Wang, B., Gutierrez, M., Shan, Y., and Zhang, Y. (2021). Laboratory study on improvement of expansive soil by chemically induced calcium carbonate precipitation. *Materials*, 14(12):3372.

Hanegbi, N. and Katra, I. (2020). A clay-based geopolymer in loess soil stabilization. *Applied Sciences*, 10(7):2608.

Hassan, I., Mohamedelhassan, E., and Yanful, E. K. (2015). Solar powered electrokinetic remediation of cu polluted soil using a novel anode configuration. *Electrochimica Acta*, 181:58–67.

Higgins, D. (2007). Briefing: Ggbs and sustainability.

Hossein, M., Bujang, B. H., Sina, K., and Saman, D. (2012). Stabilization of organic soil using sodium silicate system grout. *International Journal of Physical Sciences*, 7(9):1395–1402.

Hu, L., Wu, H., Ren, Y., and Wen, Q. (2016). Experimental study on soft soils improvement by the deep electro-osmotic consolidation technique. In *Geo-Chicago 2016*, pages 235–244.

Hu, W.-l., Liu, H., Hu, P.-f., Wang, M.-n., and Feng, X.-c. (2020). Experimental study on electrical resistivity characteristics of remodeled contaminated q3 loess. *Journal of Highway and Transportation Research and Development (English Edition)*, 14(4):37–47.

Hurley, C. H. and Thornburn, T. H. (1971). *Sodium silicate stabilization of soils: A review of the literature*. Soil Mechanics Laboratory, Department of Civil Engineering, Engineering ....

Hussein, M. (2021). Effect of sand and sand-lime piles on the behavior of expansive clay soil. *Advances in Civil Engineering*, 2021.

Hutagi, A. and Khadiranaikar, R. (2019). The effects of ggbfs on strength properties of geopolymer concrete cured at ambient temperature. In *Sustainable Construction and Building Materials*, pages 369–380. Springer.

Huter, R. (1981). Zeta potential in colloid science.

Ibrahim, N. M., Rahim, N. L., Amat, R. C., Salehuddin, S., and Ariffin, N. A. (2012). Determination of plasticity index and compression index of soil at perlis. *Apcbee Procedia*, 4:94–98.

Ingles, O. G. and Metcalf, J. B. (1972). Soil stabilization principles and practice. Technical report.

Iqbal, K., Xu, C., Nasir, H., Alam, M., Farooq, A., and Williams, E. J. (2020). Effect of used motor oil and bitumen as additive on the permeability and mechanical properties of low plastic soil. *Advances in Materials Science and Engineering*, 2020.

Isaev, B., Tsapkova, N., Badeev, S. Y., and Balatskii, V. (1995). Protecting the bed soils of foundations from damaging wetting by acids. *Soil Mechanics and Foundation Engineering*, 32(4):130–134.

Ivanov, V. and Chu, J. (2008). Applications of microorganisms to geotechnical engineering for bioclogging and biocementation of soil in situ. *Reviews in Environmental Science and Bio/Technology*, 7(2):139–153.

Izbash, Y. V., Mishurova, T., and Bronzhaev, M. (1989). Correction of consequences of harmful soaking of acid base of" khimprom" design division shop in slavyansk. *Soil Mechanics and Foundation Engineering*, 26(3):94–97.

Jawed, I. and Skalny, J. (1978). Alkalies in cement: a review: Ii. effects of alkalies on hydration and performance of portland cement. *Cement and concrete research*, 8(1):37–51.

Jayasekera, S. (2015). Electrokinetics to modify strength characteristics of soft clayey soils: a laboratory based investigation. *Electrochimica Acta*, 181:39–47.

Jian, Z., Yanli, T., Cunyi, L., and Xiaonan, G. (2019). Experimental study of electrokinetic dewatering of silt based on the electro-osmotic coefficient. *Environmental Engineering Science*, 36(6):739–748.

Jin, F., Gu, K., and Al-Tabbaa, A. (2015). Strength and hydration properties of reactive mgo-activated ground granulated blastfurnace slag paste. *Cement and Concrete Composites*, 57:8–16.

Jindal, B. B., Singhal, D., Sharma, S. K., Ashish, D. K., et al. (2017). Improving compressive strength of low calcium fly ash geopolymer concrete with alccofine. *Advances in concrete construction*, 5(1):017.

Kabanov, V., Lebedeva, G., Finkel'shtein, L., Tkachenko, G., and Shenin, O. (1977). Swelling of soils due to wetting with alkali solutions. *Soil mechanics and foundation engineering*, 14(5):338–339.

Kavak, A. and Bilgen, G. (2016). Reuse of ground granulated blast furnace slag (ggbfs) in lime stabilized embankment materials. *International Journal of Engineering and Technology*, 8(1):11.

Kavazanjian Jr, E., Almajed, A., and Hamdan, N. (2017). Bio-inspired soil improvement using eicp soil columns and soil nails. In *Grouting 2017*, pages 13–22.

Kazemian, S., Prasad, A., Huat, B. B., Bazaz, J. B., Abdul Aziz, F. N., and Mohammad Ali, T. A. (2011). Influence of cement–sodium silicate grout admixed with calcium chloride and kaolinite on sapric peat. *Journal of civil engineering and management*, 17(3):309–318.

Keramatikerman, M., Chegenizadeh, A., and Nikraz, H. (2016). Effect of ggbfs and lime binders on the engineering properties of clay. *Applied Clay Science*, 132:722–730.

Keykha, H. A., Huat, B. B., and Asadi, A. (2014). Electro-biogrouting stabilisation of soft soil. *Environmental Geotechnics*, 2(5):292–300.

Khan, K., Ashfaq, M., Iqbal, M., Khan, M. A., Amin, M. N., Shalabi, F. I., Faraz, M. I., and Jalal, F. E. (2022). Multi expression programming model for strength prediction of fly-ash-treated alkali-contaminated soils. *Materials*, 15(11):4025.

Khemissa, M. and Mahamedi, A. (2014). Cement and lime mixture stabilization of an expansive overconsolidated clay. *Applied Clay Science*, 95:104–110.

Kherad, M. K., Vakili, A. H., bin Selamat, M. R., Salimi, M., Farhadi, M. S., and Dezh, M. (2020). An experimental evaluation of electroosmosis treatment effect on the mechanical and chemical behavior of expansive soils. *Arabian Journal of Geosciences*, 13(6):1–12.

Kim, S.-O., Moon, S.-H., and Kim, K.-W. (2001). Removal of heavy metals from soils using enhanced electrokinetic soil processing. *Water, Air, and Soil Pollution*, 125(1):259–272.

Kirboga, S., Oner, M., and Akyol, E. (2014). The effect of ultrasonication on calcium carbonate crystallization in the presence of biopolymer. *Journal of crystal growth*, 401:266–270.

Krishna, K. M. and Ramesh, H. (2012). Strength and fos performance of black cotton soil treated with calcium chloride. *IOSR Journal of Mechanical and Civil Engineering (IOSRJMCE) ISSN: 2278-1684 Volume*, 2:21–25.

Kumapley, N. and Ishola, A. (1985). The effect of chemical contamination on soil strenght. In *International conference on soil mechanics and foundation engineering. 11*, pages 1199–1201.

Kumar, P. G. and Harika, S. (2021). Stabilization of expansive subgrade soil by using fly ash. *Materials Today: Proceedings*, 45:6558–6562.

Kumar, R., Kumar, V., Pandey, K., Pathak, K., Maiti, P., and Kumar, S. (2019). Analysis of differential heaving distress in soil-structure interactions due to degradation of founding soil by chemical contaminations. *Déchets Sciences et Techniques*, 80:17–22.

Kumar Sharma, A. and Sivapullaiah, P. (2012). Improvement of strength of expansive soil with waste granulated blast furnace slag. In *GeoCongress 2012: State of the Art and Practice in Geotechnical Engineering*, pages 3920–3928.

Lee, S. and Kim, J. (2020). An experimental study on enzymatic-induced carbonate precipitation using yellow soybeans for soil stabilization. *KSCE Journal of Civil Engineering*, 24(7):2026–2037.

Li, J., Guo, J., and Ma, Q. (2017). A study on the effects of chemical admixtures on the strength of portland cement. *Chemical Engineering Transactions*, 59:343–348.

Liaki, C. (2006). *Physicochemical study of electrokinetically treated clay using carbon and steel electrodes*. PhD thesis, University of Birmingham.

Ma, C., Qin, Z., Zhuang, Y., Chen, L., and Chen, B. (2015). Influence of sodium silicate and promoters on unconfined compressive strength of portland cement-stabilized clay. *Soils and Foundations*, 55(5):1222–1232.

Manjunath, K., Govindaraju, L., and Sivapullaiah, P. (2011). Blast furnace slag for bulk geotechnical applications. In *Proceedings of the Indian GeoTechnical Conference Kochi, India*.

Mathur, M. and Mathur, A. (2018). Performance of concrete by partial replacement of alccofine–1203. *Int J Eng Res Technol (IJERT)*, 6(11):2278–0181.

Méndez, E., Pérez, M., Romero, O., Beltrán, E., Castro, S., Corona, J., Corona, A., Cuevas, M., and Bustos, E. (2012). Effects of electrode material on the efficiency of

hydrocarbon removal by an electrokinetic remediation process. *Electrochimica Acta*, 86:148–156.

Merifield, R., White, D., and Randolph, M. (2009). Effect of surface heave on response of partially embedded pipelines on clay. *Journal of Geotechnical and Geoenvironmental Engineering*, 135(6):819–829.

Mitchell, J. and Soga, K. (1993). Fundamentals of soil behaviour. new york: John willy and sons.

Mitchell, J. K., Soga, K., et al. (2005). *Fundamentals of soil behavior*, volume 3. John Wiley & Sons New York.

Moghal, A. A. B., Lateef, M. A., Mohammed, S. A. S., Lemboye, K., CS Chittoori, B., and Almajed, A. (2020). Efficacy of enzymatically induced calcium carbonate precipitation in the retention of heavy metal ions. *Sustainability*, 12(17):7019.

Mohamed, M. H., Ahmed, M., Mallick, J., and Hoa, P. V. (2021). An experimental study of a nailed soil slope: Effects of surcharge loading and nails characteristics. *Applied Sciences*, 11(11):4842.

Mortensen, B., Haber, M., DeJong, J., Caslake, L., and Nelson, D. (2011). Effects of environmental factors on microbial induced calcium carbonate precipitation. *Journal of applied microbiology*, 111(2):338–349.

Mosavat, N., Oh, E., and Chai, G. (2012). A review of electrokinetic treatment technique for improving the engineering characteristics of low permeable problematic soils. *GEOMATE Journal*, 2(4):266–272.

Mosavat, N., Oh, E., and Chai, G. (2013). Laboratory assessment of kaolinite and bentonite under chemical electrokinetic treatment. *Journal of Civil & Environmental Engineering*, 3(01):1–7.

Muguda, S. and Nagaraj, H. (2019). Effect of enzymes on plasticity and strength characteristics of an earthen construction material. *International Journal of Geo-Engineering*, 10(1):1–14.

Muhammed, A., Kassim, K., Ahmad, K., Zango, M., Chong, C., and Makinda, J. (2021). Influence of multiple treatment cycles on the strength and microstructure of biocemented sandy soil. *International Journal of Environmental Science and Technology*, 18(11):3427–3440.

Mujah, D., Cheng, L., and Shahin, M. (2018). Microstructural and geo-mechanical study on bio-cemented sand for optimization of micp process. *Journal of Materials in Civil Engineering*, 31(4):04019025–04019025.

Mujtaba, H., Aziz, T., Farooq, K., Sivakugan, N., and Das, B. M. (2018). Improvement in engineering properties of expansive soils using ground granulated blast furnace slag. *Journal of the Geological Society of India*, 92(3):357–362.

Mulyukov, È. (2008). Alkaline swelling and consequences of alkalization of clayey bed soils. *Soil Mechanics & Foundation Engineering*, 45(5).

Nath, B. D., Molla, M., Ali, K., and Sarkar, G. (2017). Study on strength behavior of organic soil stabilized with fly ash. *International scholarly research notices*, 2017.

Nayak, J. and Singh, T. (2017). An experimental investigation on soil stabilization of expansive soil by using inorganic chemicals. *International Journal Of Engineering Sciences & Research Technology*, 6:12–6.

Neupane, D., Yasuhara, H., Kinoshita, N., and Unno, T. (2013). Applicability of enzymatic calcium carbonate precipitation as a soil-strengthening technique. *Journal of Geotechnical and Geoenvironmental Engineering*, 139(12):2201–2211.

Nidzam, R. and Kinuthia, J. M. (2010). Sustainable soil stabilisation with blastfurnace slag–a review. *Proceedings of the Institution of Civil Engineers-Construction Materials*, 163(3):157–165.

Oliveira, P. J. V., Freitas, L. D., and Carmona, J. P. (2017). Effect of soil type on the enzymatic calcium carbonate precipitation process used for soil improvement. *Journal of Materials in Civil Engineering*, 29(4):04016263.

Ou, C.-Y., Chien, S.-C., and Wang, Y.-G. (2009). On the enhancement of electroosmotic soil improvement by the injection of saline solutions. *Applied Clay Science*, 44(1-2):130–136.

Ou, C.-Y., Chien, S.-C., Yang, C.-C., and Chen, C.-T. (2015). Mechanism of soil cementation by electroosmotic chemical treatment. *Applied Clay Science*, 104:135–142.

Ozkan, S., Gale, R., and Seals, R. (1999). Electrokinetic stabilization of kaolinite by injection of al and po43- ions. *Proceedings of the Institution of Civil Engineers-Ground Improvement*, 3(4):135–144.

Padmaraj, D. and Chandrakaran, S. (2017). Strength improvement of soft clay with lime activated ground granulated blast furnace slag. *International Conference on GEOTECHNIQUES FOR INFRASTRUCTURE PROJECTS*.

Parsons, R. L. and Milburn, J. P. (2003). Engineering behavior of stabilized soils. *Transportation Research Record*, 1837(1):20–29.

Parthiban, D., Vijayan, D., Kausik, J., Rahman, A. A., and Veerachandru, K. (2020). Performance study on clayey soil stabilized by lime and geopolymer with partial replacement of sodium bentonite as an additive. In *AIP Conference Proceedings*, volume 2271, page 030003. AIP Publishing LLC.

Patel, A. (2019). *Geotechnical investigations and improvement of ground conditions*. Woodhead Publishing.

Pathak, A. K., Pandey, V., Murari, K., and Singh, J. (2014). Soil stabilisation using ground granulated blast furnace slag. *Int. J. Eng. Res. Appl*, 4:164–171.

Paulose, S., Reddy, P. H. P., and Jayakumar, K. (2014). Swell potential studies on soils contaminated with naoh solutions. In *Proceedings of Indian Geotechnical Conference IGC-2014, December*, pages 18–20.

Phoo-Ngernkham, T., Hanjitsuwan, S., Damrongwiriyanupap, N., and Chindaprasirt, P. (2017). Effect of sodium hydroxide and sodium silicate solutions on strengths of alkali activated high calcium fly ash containing portland cement. *KSCE Journal of Civil Engineering*, 21(6):2202–2210.

Phoo-ngernkham, T., Maegawa, A., Mishima, N., Hatanaka, S., and Chindaprasirt, P. (2015). Effects of sodium hydroxide and sodium silicate solutions on compressive and shear bond strengths of fa–gbfs geopolymer. *Construction and Building Materials*, 91:1–8.

Pivarč, J. (2011). Stone columns–determination of the soil improvement factor. *Slovak journal of civil engineering*, 19(3):17–21.

Prasad, S. S. G. and Satyanarayana, P. V. (2021). Stabilization of soft soils using single and group of sand columns. In *Advances in Sustainable Construction Materials*, pages 369–377. Springer.

Prusinski, J. R. and Bhattacharja, S. (1999). Effectiveness of portland cement and lime in stabilizing clay soils. *Transportation research record*, 1652(1):215–227.

Putra, H., Yasuhara, H., Kinoshita, N., Neupane, D., and Lu, C.-W. (2016). Effect of magnesium as substitute material in enzyme-mediated calcite precipitation for soil-improvement technique. *Frontiers in bioengineering and biotechnology*, 4:37.

Putra, H., Yasuhara, H., Kinoshita, N., Sudibyo, T., et al. (2018). Improving shear strength parameters of sandy soil using enzyme-mediated calcite precipitation technique. *Civil Engineering Dimension*, 20(2):91–95.

Radhakrishnan, G., Kumar, M. A., and Raju, G. (2014). Swelling properties of expansive soils treated with chemicals and fly ash. *Am J Eng Res*, 3(4):245–250.

Rafalko, S. D., Filz, G. M., Brandon, T. L., and Mitchell, J. K. (2007). Rapid chemical stabilization of soft clay soils. *Transportation research record*, 2026(1):39–46.

Rajak, T. K., Yadu, L., and Chouksey, S. K. (2020). Strength characteristics and stability analysis of ground granulated blast furnace slag (ggbfs) stabilized coal mine overburden-pond ash mix. *Geotechnical and Geological Engineering*, 38(1):663–682.

Ramakrishnegowda, C., Yaji, R. K., Shivashankar, R., and Sivapullaiah, P. V. (2011). Geotechnical properties of shedi soil affected by alkali contamination. *Indian J. Environ. Pollut*, 1:45–52.

Ramana Murty, V. and Hari Krishna, P. (2007). Amelioration of expansive clay slopes using calcium chloride. *Journal of materials in civil engineering*, 19(1):19–25.

Ramesh, P., Rao, A. N., and Murthy, K. (2012). Efficacy of sodium carbonate and calcium carbonate in stabilizing a black cotton soil. *Int. J. Emerg. Technolo. Adv. Eng*, 2:197–201.

Rao, S. M. and Rao, K. S. (1994). Ground heave from caustic soda solution spillage—a case study. *Soils and foundations*, 34(2):13–18.

Rather, S. A., Sharma, N., and Najar, I. A. (2019). Effects of rice husk ash (rha) and alccofine-1101 on stabilization of clay soil. *Int. Res. J. Eng. Technol.*, 6:474–478.

Reddi, L. and Inyang, H. I. (2000). *Geoenvironmental engineering: principles and applications*. CRC Press.

Reddy, A. N. and Meena, T. (2017). An experimental investigation on mechanical behaviour of eco-friendly concrete. In *IOP Conference Series: Materials Science and Engineering*, volume 263, page 032010. IOP Publishing.

Reddy, H. P., Prasad, C. R. V., and Pillai, R. J. (2017). Swelling of natural soil subjected to acidic and alkaline contamination. *Periodica Polytechnica Civil Engineering*, 61(3):611–620.

Reddy, N. G., Tahasildar, J., and Rao, B. H. (2015). Evaluating the influence of additives on swelling characteristics of expansive soils. *International Journal of Geosynthetics and Ground Engineering*, 1(1):1–13.

Reddy, P. and Sivapullaiah, P. (2011). Control of alkali induced heave in black cotton soils using potassium and magnesium salts. In *Proceedings of Indian Geotechnical Conference Kochi*.

Reddy, P. H. P. and Sivapullaiah, P. (2010). Effect of alkali solution on swell behavior of soils with different mineralogy. In *GeoFlorida 2010: Advances in Analysis, Modeling & Design*, pages 2692–2701.

Rezaee, M., Ghomesheh, P. K., and Hosseini, A. M. (2017). Electrokinetic remediation of zinc and copper contaminated soil: a simulation-based study. *Civil Engineering Journal*, 3(9):690–700.

Risco, C., López-Vizcaíno, R., Sáez, C., Yustres, A., Cañizares, P., Navarro, V., and Rodrigo, M. A. (2016). Remediation of soils polluted with 2, 4-d by electrokinetic soil flushing with facing rows of electrodes: a case study in a pilot plant. *Chemical Engineering Journal*, 285:128–136.

Rittirong, A., Shang, J. Q., Mohamedelhassan, E., Ismail, M. A., and Randolph, M. F. (2008). Effects of electrode configuration on electrokinetic stabilization for caisson anchors in calcareous sand. *Journal of geotechnical and geoenvironmental engineering*, 134(3):352–365.

Robles, I., Lozano, M., Solís, S., Hernández, G., Paz, M., Olvera, M., and Bustos, E. (2015). Electrokinetic treatment of mercury-polluted soil facilitated by ethylenediaminetetraacetic acid coupled with a reactor with a permeable reactive barrier of iron to recover mercury (ii) from water. *Electrochimica Acta*, 181:68–72.

Rohy, H., Arab, M., Zeiada, W., Omar, M., Almajed, A., and Tahmaz, A. (2019). One phase soil bio-cementation with eicp-soil mixing. In *Proceedings of the 4th world congress on civil, structural, and environmental engineering (CSEE'19)*, pages 1–8.

Ronoh, V., Too, J. K., Kaluli, J. W., and Victor, M. R. (2014). Cement effects on the physical properties of expansive clay soil and the compressive strength of compressed interlocking clay blocks. *Eur Int J Sci Technol*, 3(8):74–82.

Rupnow, T. D., Franklin, B., and White, D. J. (2015). Class c fly ash stabilization of recycled asphalt pavement and soil—a case study. In *Proc., 2015 World of Coal Ash Conf.*

Saberi, N., Aghababaei, M., Ostovar, M., and Mehrnahad, H. (2018). Simultaneous removal of polycyclic aromatic hydrocarbon and heavy metals from an artificial clayey soil by enhanced electrokinetic method. *Journal of environmental management*, 217:897–905.

Sagar, B. and Sivakumar, M. (2021). Use of alccofine-1203 in concrete: review on mechanical and durability properties. *International Journal of Sustainable Engineering*, 14(6):2060–2073.

Sambyal, L. S. and Sharma, N. (2018). Utilizing fly ash and alccofine for efficient soil stabilization. *Int. J. Sci. Eng. Res*, 9(3).

Saxena, S., Kumar, M., and Singh, N. (2018). Effect of alccofine powder on the properties of pond fly ash based geopolymer mortar under different conditions. *Environmental Technology & Innovation*, 9:232–242.

Shaik Basheer, D. V. (2017). Behavior of black cotton soil with addition of sodium carbonate and calcium carbonate. *International Research Journal of Engineering and Technology (IRJET)*, 5:1359–1365.

Shariatmadari, N., Hasanzadehshooiili, H., Ghadir, P., Saeidi, F., and Moharami, F. (2021). Compressive strength of sandy soils stabilized with alkali-activated volcanic ash and slag. *Journal of Materials in Civil Engineering*, 33(11):04021295.

Sharma, A. and Ramkrishnan, R. (2016). Study on effect of microbial induced calcite precipitates on strength of fine grained soils. *Perspectives in Science*, 8:198–202.

Sharma, A. K. and Sivapullaiah, P. V. (2016). Strength development in fly ash and slag mixtures with lime. *Proceedings of the Institution of Civil Engineers-Ground Improvement*, 169(3):194–205.

Shon, C.-S., Saylak, D., and Mishra, S. K. (2010). Combined use of calcium chloride and fly ash in road base stabilization. *Transportation research record*, 2186(1):120–129.

Shooshpasha, I. and Shirvani, R. A. (2015). Effect of cement stabilization on geotechnical properties of sandy soils. *Geomech Eng*, 8(1):17–31.

Shukla, R. P. and Parihar, N. S. (2016). Stabilization of black cotton soil using micro-fine slag. *Journal of the Institution of Engineers (India): Series A*, 97(3):299–306.

Sibley, M. and Vadgama, N. (1986). Investigation of ground heave at ici mond division, castner-kellner works, runcorn. *Geological Society, London, Engineering Geology Special Publications*, 2(1):367–373.

Sina, K., Arun, P., Bujang, B. H., Thamer, A. M., and Farah, N. A. A. (2010). Effect of cement, sodium silicate, kaolinite and water on the viscosity of the grout. *Scientific Research and Essays*, 5(22):3434–3442.

Sina, K. and Bujang, B. H. (2011). Effect of calcium chloride and kaolinite on shear strength and shrinkage of cement grout. *International Journal of Physical Sciences*, 6(4):707–713.

Singhal, D., Jindal, B. B., et al. (2017). Experimental study on geopolymer concrete prepared using high-silica rha incorporating alccofine. *Advances in concrete construction*, 5(4):345.

Singhal, D., Junaid, M. T., Jindal, B. B., Mehta, A., et al. (2018). Mechanical and microstructural properties of fly ash based geopolymer concrete incorporating alccofine at ambient curing. *Construction and building materials*, 180:298–307.

Singhi, B., Laskar, A. I., and Ahmed, M. A. (2016). Investigation on soil–geopolymer with slag, fly ash and their blending. *Arabian Journal for science and engineering*, 41(2):393–400.

Sinha, U., Sharma, A., Bhargava, S., Minocha, A., and Kumar, P. (2003). Effect of seepage of caustic soda on foundation and remedial measure in alumina plant. *Proc Geo-Tech Eng Infrastruct Dev*, 1:229–234.

Sivapullaiah, P. (2015). Surprising soil behaviour: is it really!!! *Indian Geotechnical Journal*, 45(1):1–24.

Sivapullaiah, P., Allam, M., and Sankara, G. (2004). Structural distortion due to heaving of foundation soil induced by alkali contamination. In *Proc. International Conference on Structural and Foundation Failures*, pages 2–4.

Sivapullaiah, P. et al. (2006). Ferric chloride treatment to control alakli induced heave in weathered red earth. *Geotechnical & Geological Engineering*, 24(5):1115–1130.

Sivapullaiah, P. et al. (2007). Induced swelling of kaolinitic soil in alkali solution. *Soils and foundations*, 47(1):59–66.

Sivapullaiah, P. and Hari Prasad Reddy, P. (2010). Potassium chloride treatment to control alkali induced heave in black cotton soil. *Geotechnical and Geological Engineering*, 28(1):27–36.

Sivapullaiah, P. and Manju (2006). Lime treatment to control alkali induced heave in soils. *Proceedings of the Institution of Civil Engineers-Ground Improvement*, 10(1):31–37.

Sivapullaiah, P. and Reddy, P. H. P. (2009). Fly ash to control alkali-induced volume changes in soils. *Proceedings of the Institution of Civil Engineers-Ground Improvement*, 162(4):167–173.

Sivapullaiah, P., Reddy, P. H. P., and Ramesh, H. (2008). Mitigation of alkali induced heave in rectorite soil with fly ash. In *GeoCongress 2008: Geotechnics of Waste Management and Remediation*, pages 700–707.

Sivapullaiah, P. V. et al. (2005). Kaolinite–alkali interaction and effects on basic properties. *Geotechnical & Geological Engineering*, 23(5):601–614.

Sivapullaiah, P. V., Prakash, B. S. N., and Suma, B. N. (2015). Electrokinetic removal of heavy metals from soil. *Journal of Electrochemical Science and Engineering*, 5(1):47–65.

Sivapullaiah, P. V., Sankara, G., and Allam, M. M. (2010). Mineralogical changes and geotechnical properties of an expansive soil interacted with caustic solution. *Environmental Earth Sciences*, 60(6):1189–1199.

Sokolovich, V. and Troitskii, G. (1976). Heaving of a sand base as a consequence of the development of secondary crystal hydrate formations. *Soil Mechanics and Foundation Engineering*, 13(6):376–378.

Solanki, P. and Zaman, M. (2012). Microstructural and mineralogical characterization of clay stabilized using calcium-based stabilizers. In *Scanning electron microscopy*, pages 771–798. IntechOpen.

Soni, A. and Varshney, D. (2021). Experimental study of the effect of alkali contamination on geo-mechanical properties of the soil. In *IOP Conference Series: Materials Science and Engineering*, volume 1116, page 012173. IOP Publishing.

Srinath, B. S., Patnaikuni, C. K., Balaji, K., Kumar, B. S., and Manjunatha, M. (2021). A prospective review of alccofine as supplementary cementitious material. *Materials Today: Proceedings*, 47:3953–3959.

Sruthi, P. L. et al. (2017). Characterization of kaolinitic clays subjected to alkali contamination. *Applied Clay Science*, 146:535–547.

Suganya, K. and Sivapullaiah, P. (2016). Role of sodium silicate additive in cement-treated kuttanad soil. *Journal of Materials in Civil Engineering*, 28(6):06016006.

Suresh, R. and Murugaiyan, V. (2021a). Experimental studies on influence of alccofine and calcium chloride on geotechnical properties of expansive soil. In *Proceedings of the Indian Geotechnical Conference 2019*, pages 629–640. Springer.

Suresh, R. and Murugaiyan, V. (2021b). Microstructural behavior of expansive soil using calcium chloride and alccofine. *Materials Today: Proceedings*, 46:8397–8403.

Swamy, R., Sarvade, P. G., and Deepak, N. (2015). Utilization of ggbs and lime to improve the compaction and unconfined strength properties of marine clay. *In: 2nd International Conference on Emerging Trends in Technology and Applied Sciences (ICETTAS'15), 2015, Kottayam.*, pages 3920–3928.

Szendefy, J. (2013). Impact of the soil-stabilization with lime. In *Proceedings of the 18th international conference on soil mechanics and geotechnical engineering, Paris*, pages 2601–2604.

Tang, Y., Wang, N., and Liu, T. (2021). Electrokinetic stabilization of marine clayey soils by different injection procedures. *Int. J. Electrochem. Sci*, 16(210223):210223.

Tastan, E. O., Edil, T. B., Benson, C. H., and Aydilek, A. H. (2011). Stabilization of organic soils with fly ash. *Journal of geotechnical and Geoenvironmental Engineering*, 137(9):819–833.

Taubald, H., Bauer, A., Schäfer, T., Geckeis, H., Satir, M., and Kim, J. (2000). Experimental investigation of the effect of high-ph solutions on the opalinus shale and the hammerschmiede smectite. *Clay Minerals*, 35(3):515–524.

Thangapandi, K., Anuradha, R., Archana, N., Muthuraman, P., Awoyera Paul, O., and Gobinath, R. (2020). Experimental study on performance of hardened concrete using nano materials. *KSCE Journal of Civil Engineering*, 24(2):596–602.

Thyagaraj, T., Rao, S. M., Sai Suresh, P., and Salini, U. (2012). Laboratory studies on stabilization of an expansive soil by lime precipitation technique. *Journal of Materials in Civil Engineering*, 24(8):1067–1075.

Tiwari, N., Satyam, N., and Sharma, M. (2021). Micro-mechanical performance evaluation of expansive soil biotreated with indigenous bacteria using micp method. *Scientific Reports*, 11(1):1–12.

Turer, D. and Genc, A. (2005). Assessing effect of electrode configuration on the efficiency of electrokinetic remediation by sequential extraction analysis. *Journal of Hazardous Materials*, 119(1-3):167–174.

Ukleja, J. (2020). Stabilization of landslides sliding layer using electrokinetic phenomena and vacuum treatment. *Geosciences*, 10(8):284.

Umar, M., Kassim, K. A., and Chiet, K. T. P. (2016). Biological process of soil improvement in civil engineering: A review. *Journal of Rock Mechanics and Geotechnical Engineering*, 8(5):767–774.

Vindula, S. K. and Chavali, R. V. P. (2018). Role of fly ash in control of alkali induced swelling in kaolinitic soils: a micro-level investigation. *International Journal of Geotechnical Engineering*, 12(1):46–52.

Vindula, S. K., Chavali, R. V. P., Reddy, P. H. P., and Srinivas, T. (2019). Ground granulated blast furnace slag to control alkali induced swell in kaolinitic soils. *International Journal of Geotechnical Engineering*, 13(4):377–384.

Wan, Y., Zhai, J., and Wang, A. (2021). Comparative study on electrode arrangement in electrokinetic remediation of contaminated soil. *Nature Environment and Pollution Technology*, 20(1):221–227.

Wanare, R., Jayanthi, P., and Iyer, K. K. (2022). A study on cracking behavior of marine soil modified with ultrafine slag under cured and uncured conditions. *Materials Today: Proceedings*.

Winterkorn, H. F. and Pamukcu, S. (1991). Soil stabilization and grouting. In *Foundation engineering handbook*, pages 317–378. Springer.

Wu, H., Hu, L., and Zhang, G. (2016). Effects of electro-osmosis on the physical and chemical properties of bentonite. *Journal of Materials in Civil Engineering*, 28(8):06016010.

Xiao, J. and Zhou, S. (2019). Effect of electrode materials on electro kinetic remediation of uranium contaminated soil. In *IOP Conference Series: Earth and Environmental Science*, volume 300, page 032074. IOP Publishing.

Yadu, L. and Tripathi, R. (2013). Effects of granulated blast furnace slag in the engineering behaviour of stabilized soft soil. *Procedia Engineering*, 51:125–131.

Yasuhara, H., Neupane, D., Hayashi, K., and Okamura, M. (2012). Experiments and predictions of physical properties of sand cemented by enzymatically-induced carbonate precipitation. *Soils and Foundations*, 52(3):539–549.

Yeung, A. T. (2006). Contaminant extractability by electrokinetics. *Environmental Engineering Science*, 23(1):202–224.

Yi, Y., Li, C., and Liu, S. (2015). Alkali-activated ground-granulated blast furnace slag for stabilization of marine soft clay. *Journal of materials in civil engineering*, 27(4):04014146.

Yi, Y., Liska, M., and Al-Tabbaa, A. (2014). Properties and microstructure of ggbs–magnesia pastes. *Advances in Cement Research*, 26(2):114–122.

Yilmaz, Y. (2015). Compaction and strength characteristics of fly ash and fiber amended clayey soil. *Engineering Geology*, 188:168–177.

Yonekura, R. and Kaga, M. (1992). Current chemical grout engineering in japan. In *Grouting, soil improvement and geosynthetics*, pages 725–736. ASCE.

Zhu, M., Zhang, Q., Zhang, X., and Hui, B. (2018). Comparative study of soil grouting with cement slurry and cement-sodium silicate slurry. *Advances in materials science and engineering*, 2018.

Zhuang, Y., Huang, Y., Liu, F., Li, Z., and Zou, W. (2013). Soft ground improvement using electro-osmosis. In *6th Symposium Umweltgeotechnik and 7th Freiberger Geotechnik-Kolloquium "Ressourcen & Geotechnik*, pages 97–102.

Zumrawi, M. and Awad, M. (2017). Effect of bitumen and fly ash on expansive soil properties. *Journal of Scientific and Engineering Research*, 4(9):228–237.

Zumrawi, M. M. and Eltayeb, K. A. (2016). Laboratory investigation of expansive soil stabilized with calcium chloride. *Int. J. Environ. Chem. Ecol. Geol. Geophys. Eng*, 10(2).

List of Publications

1. **Mandal, M. K.**, & Paramkusam,B.R. (2022). Assessment of alkali-induced heave in soil and its stabilisation using slag. Proceedings of the Institution of Civil Engineers-Ground Improvement, 1-13. (Published)

2. **Mandal, M. K.**, & Paramkusam,B.R. (2022). Analysis of Alkali-induced Soil Heaving in Non-Expansive Soil using Electrokinetic. Nature Environment & Pollution Technology, 21(4).https://doi.org/10.46488/NEPT.2022.v21i04.000 (Accepted).