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| S. No | | | Page No. |
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| 1. | **Authors:** | **Sneha P. Hirkane, N. G. Gore, P. J. Salunke** | |
| | **Paper Title:** | **Combine Application of Stone Column and PVD** | |
| | **Abstract:** Ground Improvement techniques are often used to improve sub soil properties in terms of their bearing capacity, shear strength, settlement characteristics, drainage, etc. These techniques have a wide range of applicability from coarse grained soils to fine grained soils. Depending upon the loading conditions and nature of soil, a suitable technique which is also economical needs to be adopted. This paper gives the concept and theory of a two ground improvement technique and their combine application for improving the ground.<br><br>**Keywords:** Improve, capacity, shear strength, settlement characteristics, drainage, and techniques.<br><br>**References:**<br>1. Hughes, J.M.O. and Withers, N.J.: Reinforcing of soft cohesive soils with stone columns, Ground Engineering, (1974). (7), 3, p 42-49<br>2. Slocombe, B.C., Bell, A.L. and Baez, J.I. The densification of granular soil using Vibroreplacement, Geotechnique, (2000), L, 6, p 715-726<br>3. Hamed Niroudmand, Khairul Anuar Kassim, "Soil improvement by reinforced stone column based on experimental work ",EJGE,(2011),16<br>4. V. R. Raju, Y. Hari Krishna. Ground Improvement Techniques for Infrastructure Projects in Malaysia The 12th International Conference of International Association for Computer Methods and Advances in Geomechanics (IACMAG) 1-6 October, 2008 Goa, India<br>5. SinaKazemian, Bujang. B. K. Huat Assessment and Comparison of Grouting and Injection Methods in Geotechnical Engineering European Journal of Scientific Research. (2009), 27, (2)<br>6. Lo, S.R.,Mak,J., 2010 .Geosnthetic-encased stone column in soft clay: a numerical study geotextiles and geomembrane 28,292-302.<br>7. Dhar, A.S., Siddique, A., Ameen, S.F., (2011). Ground Improvement using Pre-loading with Prefabricated Vertical Drains. International Journal of Geoengineering Case Histories. (2011), 2, (2), pg no 86-104<br>8. Foundation design manual.<br>9. Foundation engineering by S.B. More and S.S. Jahagirdhar Nirali Prakashan.<br>10. IS 15284(part 1):2003, design and construction for Ground improvement guideline. | | **1-3** |
| 2. | **Authors:** | **Kurapati Srinivas** | |
| | **Paper Title:** | **Reliable Gas Sensors using ZNO Nanostructures** | |
| | **Abstract:** Gas sensors are devices that can convert the concentration of an analyte gas into an electronic signal. Zinc oxide (ZnO) is an important n-type metal oxide semiconductor which has been utilized as sensor for several decades. In recent years, there have been extensive investigations of nanoscale semiconductor gas sensors. The size reduction of ZnO sensors to nanometer scale provides a good opportunity to dramatically increase their sensing properties in comparison with their macro scale counterparts. Among the semiconductor metal oxides, zinc oxide (ZnO) is one of the most widely used gas sensing material. Before making any gas sensor, it is very much necessary to know the sensitivity , selectivity of the sensor and their optimization. In this paper, we present the growth of ZnO nanostructures by thermal evaporation technique and investigation of their gas sensing properties. It is observed that the sensing characteristics of single nanowires and films made using nanowires to clearly differentiate the intra grain and grain boundary contributions as well as to develop sensors with better sensitivity/ selectivity. This paper is very much useful for those who would like work on gas sensors for better gas sensing performances.<br><br>**Keywords:** Gas sensor, Nanowires, ZnO.<br><br>**References:**<br>1. Y.W. Chen, Q. Qiao, Y.C. Liu, G.L. Yang, Size-controlled synthesis and opticalproperties of small-sized ZnOnanorods, Journal of Physical Chemistry C 113(2009) 7497–7502.<br>2. R. Hong, J. Li, L. Chen, D. Liu, H. Li, Y. Zheng, et al., Synthesis, surface modification and photocatalytic property of ZnO nanoparticles, Powder Technology189 (2009) 426–432.<br>3. X.B. Zhao, G.M. Ashley, G.G. Luis, H. Jin, J.K. Luo, J.R. Lu, Protein functionalizedZnO thin film bulk acoustic resonator as an odorant biosensor, Sensors andActuators B 163 (2012) 242–246.<br>4. S.S. Nath, M. Choudhury, D. Chakdar, G. Gope, R.K. Nath, Acetone sensing prop-erty of ZnO quantum dots embedded on PVP, Sensors and Actuators B 148(2010) 353–357.<br>5. A. Forleo, L. Francioso, S. Capone, P. Siciliano, P. Lommens, Z. Hens, Synthesisand gas sensing properties of ZnO quantum dots, Sensors and Actuators B 146(2010) 111–115.<br>6. S.L. Bai, J.W. Hu, D.Q. Li, R.X. Luo, A.F. Chen, C.C. Liu, Quantum-sized ZnOnanoparticles: synthesis, characterization and sensing properties for NO2, Jour-nal of Materials Chemistry 21 (2011) 12288–12294.<br>7. A. Moulahi, F. Sediri, N. Gharbi, Hydrothermal synthesis of nanostructuredzinc oxide and study of their optical properties, Materials Research Bulletin47 (2012) 667–671.<br>8. G.X. Du, L.D. Zhang, Y. Feng, Y.Y. Xu, Y.X. Sun, B. Ding, Q. Wang, Control-lable synthesis of ZnO architectures by a surfactant-free hydrothermal process,Materials Letters 73 (2012) 86–88.<br>9. Z. Gergintschew, H. Forster, J. Kositza, D. Schipanski, Two-dimensional numerical simulation of semiconductor gas sensors, Sensors and Actuators B 26 (1995)170–173.<br>10. M. Egashira, Y. Shimizu, Y. Takao, S. Sako, Variations in I–V characteristics ofoxide semiconductors induced by oxidizing gases, Sensors and Actuators B 35(1996) 62–67.<br>11. Greene, L. E.; Yuhas, B. D.; Law, M.; Zitoun, D.; Yang, P. ," Solution-Grown Zinc Oxide Nanowires",Inorg. Chem. 2006, | | **4-8** |

45, 7535-7543.
12. Wang, Z. L.,"Novel nanostructures of ZnO for nanoscale photonics, optoelectronics, piezoelectricity, and sensing", Appl. Phys. A: Mater. Sci. Process. 2007, 88, 7-15.
13. Özgür, Ü.; Alivov, Y. I.; Liu, C.; Teke, A.; Reshchikov, M. A.; S. Doğan, V. A.; Cho, S. J.; Morkoçd, H. A comprehensive review of ZnO materials and devices, J. Appl. Phys. 2005, 98, 041301-103.
14. Look, D. C. " Recent advances in ZnO material and devices ",Mater. Sci. Eng., B 2001, 80, 383-387.
15. Pearton, S. J.; Norton, D. P.; Ip, K.; Heo, Y. W.; Steiner, T. " Recent progress in processing and properties of Zno", SuperlatticesMicrostruct. 2003, 34, 3-32.
16. Kohl, D. "Surface processes in the detection of reducing gases with SnO2-based devices". Sens. Actuators 1989, 18, 71-113.
17. Zhang, Y.; Yu, K.; Jiang, D.; Zhu, Z.; Geng, H.; Luo, L. "Zinc oxide nanorod and nanowire for humidity sensor", Appl. Surf. Sci. 2005, 242.
18. Harrison, P. G.; Willett, M. J. ," The mechanism of operation of tin(IV) oxide carbon monoxide sensors," Nature 1988, 332, 227-339.
19. Kolmakov, A.; Zhang, Y.; Cheng, G.; Moskovits, "Detection of CO and O2 Using Tin Oxide Nanowire Sensors "M. Adv. Mater. 2003, 15, 997-1000.
20. Wan, Q.; Li, Q. H.; Chen, Y. J.; Wang, T. H.; He, X. L.; Li, J. P.; Lin, C. L. "Fabrication and ethonal sensing characterstics of ZnO nanowire gas sensors", Appl. Phys. Lett. 2004, 84, 3654-3656.
21. Rout, C. S.; Krishna, S. H.; Vivekchand, S. R. C.; Govindaraj, A.; Rao, C. N. R.," Hydrogen and ethanol sensors based on ZnOnanorods, nanowires and nanotubes",Chem. Phys. Lett. 2006, 418, 586-590.
22. Wang D, Zhu R, Zhou Z and Ye X," Controlled assembly of zinc oxide nanowires using dielectrophoresis", 2007 Appl. Phys. Lett. 90 (p. 3),103110.
23. S K Gupta, Aditee Joshi and Manmeet Kaur, "Development of gas sensors using ZnO nanostructures" , J. Chem. Sci., Vol. 122, No. 1, January 2010, pp. 57–62.

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| **3.** | **Authors:** | **Kurpapti Srinivas** |
| | **Paper Title:** | **Possible Lead-Free Nanocomposite Polymer Dielectrics for High Energy Storage Applications** |

**Abstract:** There is an increasing demand to improve the energy density of dielectric capacitors for satisfying the next generation material systems. One effective approach is to embed high dielectric constant inclusions such as lead zirconia titanate in polymer matrix. However, with the increasing concerns on environmental safety and biocompatibility, the need to expel lead (Pb) from modern electronics has been receiving more attention. Using high aspect ratio dielectric inclusions such as nanowires could lead to further enhancement of energy density. Therefore, the present brief review work focuses on the feasibility of development of a lead-free nanowire reinforced polymer matrix capacitor for energy storage application. It is expected that Lead-free sodium Niobate nanowires (NaNbO3) will be a future candidate to be synthesized using simple hydrothermal method, followed by mixing them with polyvinylidene fluoride (PVDF) matrix using a solution-casting method for Nanocomposites fabrication. The energy density of NaNbO3/PVDF composites are also be compared with that of lead-containing (PbTiO3/PVDF) Nano composites to show the feasibility of replacing lead-containing materials from high-energy density dielectric capacitors. This paper is very much useful researchers who would like to work on polymer nanocomposites for high energy storage applications.

**Keywords:** Polymer nanocomposite, high energy, storage capacitors.

**References:**

1. K. M. Slenes, P. Winsor, T. Scholz, and M. Hudis, "Pulse power capability of high energy density capacitors based on a new dielectric material," IEEE Trans. Magn. 37, 324 2001.
2. C. A. Randall, S. Miyazaki, K. L. More, A. S. Bhalla, and R. E. Newnham, "Structural-Property Relations in Dielectrophoretically Assembled BaTiO 3 Nanocomposites," Mater. Lett. 15, 26 _1992.
3. C. P. Bowen, R. E. Newnham, and C. A. Randall, Dielectric properties of dielectrophoretically assembled particulate-polymer composites. J. Mater. Res. 13, 205 1998.
4. A. Randall, D. V. Miller, J. H. Adair, and A. S. Bhalla, Processing of electroceramic-polymer composites using the electrorheological effect., J. Mater. Res. 8, 899 _1993.
5. Application Note 1217-1, "Basics of Measuring the Dielectric Properties of Materials," Hewlett Packard Literature Number 5091-3300E, Pp. 6 (1992).
6. G. J. Johnson, Solid State Tesla Coil, Chap. 3 Lossy Capacitors (2001), available at www.eece.ksu.edu/~gjohnson/.
7. O. E. Gouda, A. M. Thabet and H. H. El-Tamaly, "How to Get Low Dielectric Losses in Binary and Multi-mixtures Dielectrics at High Frequency," 39th International Universities Engineering Conference, Vol. 3, Pp. 1237-1240 (2004).
8. M. Lanagan, "Glass Ceramic Materials for Pulsed Power Capacitors," NSF Center for Dielectric Studies Meeting, Albuquerque, NM, May (2004).
9. Y. Xiaojun, Y. Zhimin, M. Changhui and D. Jun, "Dependence of Dielectric Properties of BT Particle Size in EP/BT Composites," Rare Metals, Vol. 25, Pp. 250 (2006).
10. Y. Cao, P. C. Irwin and K. Younsi, "The Future of Nanodielectrics in the Electrical Power Industry," IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 7, Pp. 797 (2004).
11. F. Ciuprina, I. Plesa, P. V. Notingher, T. Tudorache and D. Panaitescu, "Dielectric Properties of Nanodielectrics with Inorganic Fillers," CEIDP Annual Report Conference on Electrical Insulation and Dielectric Phenomena, Pp. 682-685 (2008).
12. P. Kim, S. C. Jones, P. J. Hotchkiss, J. N. Haddock, B. Kippelen, S. R. Marder and J. W. Perry, "Phosphonic acid-modified Barium Titanate Polymer Nanocomposites with High Permittivity and Dielectric Strength," Advanced Materials, Vol. 19, Pp. 1001-1005 (2007).
13. S. Ramesh, B. A. Shutzberg, C. Huang, J. Gao and E. P. Giannelis, "Dielectric Nanocomposites for Integral Thin Film Capacitors: Materials Design, Fabrication and Integration Issues," IEEE Transactions on Advanced Packaging, Vol. 26, Pp. 17 (2003).
14. Y. Bai, Z.-Y. Cheng, V. Bharti, H. S. Xu and Q. M. Zhang, "High-Dielectric-Constant Ceramic-Powder Polymer Composites," Applied Physics Letters, Vol. 76, Pp. 3804 (2000).
15. S. Liang, S. R. Chong and E. P. Giannelis, "Barium Titanate/Epoxy Composite Dielectric Materials for Integrated Thin Film Capacitors," In Proceedings of 48th Electronic Components and Technology Conference, Pp. 171 (1998).
16. T. J. Lewis, "Interfaces: nanometric dielectrics," Journal of Physics D: Applied Physics, Vol. 38, Pp. 202 (2005).

17. J. K. Nelson and Y. Hu, "Nanocomposite dielectrics – properties and implications," Journal of Applied Physics D: Applied Physics, Vol. 38, Pp. 318 (2005).
18. M. Roy, J. K. Nelson, R. K. MacCrone, L. S. Schadler, C. W. Reed, R. Keefe and W. Zenger, "Polymer Nanocomposite Dielectrics – The Role of the Interface," IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 12, Pp. 629 (2005).
19. R. C. Smith, C. Liang, M. Landry, J. K. Nelson and L. S. Schadler, "The Mechanisms Leading to the Useful Electrical Properties of Polymer Nanodielectrics," IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 15, Pp. 187-196 (2008).
20. J. K. Nelson, "Overview of Nanodielectrics: Insulating Materials of the Future," IEEE Electrical Insulation Conference and Electrical Manufacturing Expo, Pp. 229-235 (2007).
21. L. J. Gilbert, T. P. Schuman and F. Dogan, "Dielectric Powder/Polymer Composites for High Energy Density Capacitors," Advances in Electronic and Electrochemical Ceramics: Proceedings of the 107th Annual Meeting of the American Ceramic Society, Wiley, Baltimore, Maryland, USA (2005).
22. P. M. Ajayan, L. S. Schadler and P. V. Brawn, Nanocomposite Science and Technology, Wiley-VCH: Weinheim, Germany (2003).
23. M.-A. Neouze and U. Schubert, "Surface Modification and Functionalization of Metal and Metal Oxide Nanoparticles by Organic Ligands," Monatshefte fur Chemie, Vol. 139, No. 3, Pp. 183-195 (2008).
24. M. Hosokawa, K. Nogi, M. Naito and T. Yokoyama, (Ed) Nanoparticle Technology Handbook, Elvesier: Oxford, UK (2007).
25. T. P. Schuman, S. Siddabattuni, O. Cox and F. Dogan, "Improved Dielectric Breakdown Strength of Covalently-Bonded Interface Polymer-Particle Nanocomposites," Composite Interfaces, Vol. 17, No. 8, Pp. 719-731 (2010).
26. N. Jayasundere and B. V. Smith, "Dielectric Constant for Binary Piezoelectric 0-3 Composites," Journal of Applied Physics, Vol. 73, No. 5, Pp. 2462-2466 (1993).
27. Y. Rao, J. Qu, T. Marinis and C. P. Wong, "A Precise Numerical Prediction of Effective Dielectric Constant for Polymer-Ceramic Composite Based on Effective Medium Theory," IEEE Transactions on Advanced Packaging Technologies, Vol. 23, No. 4, Pp. 680-683 (2000).
28. J. P. Calame, "Finite Difference Simulations of Permittivity and Electric Field Statistics in Ceramic-Polymer Composites for Capacitor Applications," Journal of Applied Physics, Vol. 99, 084101 (2006).
29. C. Huang, Q. Zhang, "Enhanced Dielectric and Electromechanical Responses in High Dielectric Constant All-Polymer Percolative Composites," Advanced Functional Materials, Vol. 14, No. 5, Pp. 501-506 (2004).
30. J. G. Head, N. M. White and P. S. Gale, "Modification of the Dielectric Properties of Polymeric Materials," 5th International Conference on Dielectric Materials, Measurement and Applications, Issue. 27-30, Pp. 61-64 (1988).
31. D. S. McLachlan, M. Blaskiewicz and R. E. Newnham, "Electrical Resistivity of Composites," Journal of American Ceramic Society, Vol. 73, No. 8, Pp. 2187-2203 (1990).
32. J. R. Kokan, R. A. Gerhardt, R. Ruh and D. S. McLachlan, "Dielectric Spectroscopy of Insulator/Conductor Composites," Pp. 341-346 in Materials Research Society Symposium Proceedings, Vol. 500, Electrically Based Microstructural Characterization II, Edited by R. A. Gerhardt, M. A. Alim and S. R. Taylor, Materials Research Society, Pittsburgh, PA (1998).
33. R. Zallen, The Physics of Amorphous Solids, John Wiley & Sons: New York (2004).
34. S. Kirkpatrick, "Percolation and Conduction," Reviews of Modern Physics, Vol. 45, No. 4, Pp. 574-588 (1973).
35. C. Mukherjee, K. Bardhan and M. Heaney, "Predictable Electrical Breakdown in Composites," Physical Review Letters, Vol. 83, No. 6, Pp. 1215-1218 (1999).
36. M. Lanagan, "High Power Capacitors and Energy Storage," presented at Materials Day, University Park, Penn State University, April 14 (2008).
37. L. A. Dissado and L. C. Fothergill, Electrical Degradation and Breakdown in Polymers, Peter Peregrins Ltd.: London, UK (1992).
38. S. Li, G. Yin, G. Chen, J. Li, S. Bai, L. Zhong, Y. Zhang and Q. Lei, "Short-term Breakdown and Long-term Failure in Nanodielectrics," IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 17, No. 5, Pp. 1523-1535 (2010).
39. J. J. O'Dwyer, The Theory of Dielectric Breakdown of Solids, Oxford University Press: London, UK (1964).
40. J. Claude, Y. Lu and Q. Wang, "Effect of Molecular Weight on the Dielectric Breakdown Strength of Ferroelectric Poly(vinylidene fluoride-chlorotrifluoroethylene)s," Applied Physics Letters, Vol. 91, Issue. 21, 212904 (2007).
41. Z. Tian, X. Wang, L. Shu et al., "Preparation of nano BaTiO3-based ceramics for multilayer ceramic capacitor application by chemical coating method," Journal of the American Ceramic Society, vol. 92, no. 4, pp. 830–833, 2009.
42. M. Unruan, T. Sareein, J. Tangsritrakul et al., "Changes in dielectric and ferroelectric properties of Fe3+/Nb5+ hybrid doped barium titanate ceramics under compressive stress," Journal of Applied Physics, vol. 104, no. 12, Article ID 124102, 2008.
43. O. Guillon, J. Chang, S. Schaab, and S.-J. L. Kang, "Capacitance enhancement of doped barium titanate dielectrics and multilayer ceramic capacitors by a post-sintering thermo mechanical treatment," Journal of the American Ceramic Society, vol. 95, no. 7, pp. 2277–2281, 2012.
44. S. S. Ibrahim, A. A. Al Jaafari, and A. S. Ayesh, "Physical characterizations of three phase polycarbonate nanocomposites," Journal of Plastic Film and Sheeting, vol. 27, no. 4, pp. 275–291, 2011.
45. L. Xie, X. Huang, C. Wu, and P. Jiang, "Core-shell structured poly(methyl methacrylate)/BaTiO3 nanocomposites prepared by in situ atom transfer radical polymerization: a route to high dielectric constant materials with the inherent low loss of the base polymer," Journal of Materials Chemistry, vol. 21, no. 16, pp. 5897–5906, 2011.
46. P. Kim, N. M. Doss, J. P. Tillotson et al., "High energy density nanocomposites based on surface-modified BaTiO3 and a ferroelectric polymer," ACS Nano, vol. 3, no. 9, pp. 2581–2592, 2009.
47. Y. P.Mao, S. Y.Mao, Z.-G. Ye, Z. X. Xie, and L. S. Zheng, "Sizedependences of the dielectric and ferroelectric properties of BaTiO3/polyvinylidene fluoride nanocomposites," Journal of Applied Physics, vol. 108, no. 1, Article ID 014102, 2010.
48. Z.-M. Dang, J.-K. Yuan, J.-W. Zha, T. Zhou, S.-T. Li, and G.-H. Hu, "Fundamentals, processes and applications of 8 ISRN Nanomaterials high-permittivity polymer-matrix composites," Progress in Materials Science, vol. 57, no. 4, pp. 660–723, 2012.
49. L. Ni and X. M. Chen, "Dielectric relaxations and formation mechanism of giant dielectric constant step in CaCu3Ti4O12 ceramics," Applied Physics Letters, vol. 91, no. 12, Article ID 122905, 2007.
50. A. Chen, K. Kamata, M. Nakagawa, T. Iyoda, H.Wang, and X. Li, "Formation process of silver-polypyrrole coaxial nanocables synthesized by redox reaction between AgNO3 and pyrrole in the presence of poly(vinylpyrrolidone)," Journal of Physical Chemistry B, vol. 109, no. 39, pp. 18283–18288, 2005.
51. P. Barber, S. Balasubramanian, Y. Anguchamy et al., "Polymer composite and nanocomposite dielectric materials for pulse power energy storage," Materials, vol. 2, pp. 1697–1733, 2009.
52. D. K. Das-Gupta and K. Doughty, "Polymer-ceramic composite materials with high dielectric constants," Thin Solid Films, vol. 158, no. 1, pp. 93–105, 1988.
53. C. Andrews, Y. Lin, and H. A. Sodano, "The effect of particle aspect ratio on the electroelastic properties of piezoelectric nanocomposites," Smart Materials and Structures, vol. 19, no.2, Article ID 025018, 2010.
54. H. Tang, Y. Lin, C. Andrews, and H. A. Sodano, "Nanocomposites with increased energy density through high aspect ratio PZT nanowires," Nanotechnology, vol. 22, no. 1, Article ID 015702, 2011.
55. MiguelMendoza,Md Ashiqur Rahaman Khan,Mohammad Arif Ishtiaque Shuvo,

56. Alberto Guerrero, and Yirong Lin, "Development of Lead-Free Nanowire Composites for Energy Storage Applications", International Scholarly Research Network ISRN Nanomaterials Volume 2012, Article ID 151748, 8 pages.

**4.**

**Authors:** **Payam Vahedi**

**Paper Title:** **Electronic Commutation Consideration in Modeling of Radial-Flux Surface Mounted PM Machines**

**Abstract:** In order to keep the permanent magnet motor running, the magnetic field produced by the windings should shift position, as the rotor moves to catch up with the stator field. Rotor position is sensed using Hall effects sensors. With these sensors 6 different commutation are possible every 15°. Hence, this paper presents a model procedure for these 6 points. The aim of this paper is presented a magnetic model of surface mounted permanent magnet machine for different rotor positions.This paper is presented a PM machine with double layer concentrated winding with 8 poles and 12 slots. The FEM analysis is used for validation of models.

**Keywords:** Finite element method, Modeling Permanent magnet machine, Radial flux.

**References:**

1. Jabbari, Ali, M. Shakeri, A. S. Gholamian, 2009. Rotor pole shape optimization of permanent magnet brushless DC motor using the reduced basis technique. Advances in electrical and computer engineering, 9: 75-81.
2. Hassanpour Isfahani, Arash, and Sadeghi, Siavash, 2008. Design of a Permanent Magnet Synchronous Machine for the Hybrid Electric Vehicle. World Academy of Science, Engineering and Technology 45: 566-570.
3. Meessen, K. J., Thelin, P., Soulard, J. and Lomonova1, E. A., 2008. Inductance Calculations of Permanent-Magnet Synchronous Machines Including Flux Change and Self- and Cross-Saturations. IEEE Transaction on magnetic, 44: 2324-2331.
4. Krishnan, R., 2001. Switched Reluctance Motor Drives: Modeling, Simulation, Analysis, Design and Applications. 1st Edn. CRC Press, New York. ISBN-13: 978-0849308383, pp: 432.
5. Sadeghierad, M., H. Lesani, H. Monsef and A. Darabi, 2008. Leakage in modeling of high speed axial flux PM generator. Proceedings of the IEEE International Conference on Industrial Technology, April 21-24, Chengdu, pp: 1–6.

**15-21**

**5.**

**Authors:** **Mohamad Owais Raja, Tazeem A Khan, Junaid Geelani**

**Paper Title:** **Analytical Study of Watermarking Techniques**

**Abstract:** The increasing amount of research on watermarking over the past decade has been largely driven by its important applications in digital copyrights management and protection. One of the first applications for watermarking was broadcast monitoring. In this paper presented LSB substitution and threshold-based correlation techniques, performance analysis on the basis of their various types of noises. In this analysis, Different image simulated using two watermarks techniques. We used simulation through using Matlab Simulator.

**Keywords:** Digital watermarking, LSB substitution, threshold based correlation.

**References:**

1. M. D. Swanson, M. Kobayashi, and A. H. Tewfik, "Multimedia Data Embedding and Watermarking Technologies", IEEE Proc. 86, (6), pp. 1064□ 1087, 1998.
2. F. Mintzer, W. Braudaway, and M. M. Yeung, "Effective and Ineffective Digital watermarks", Proc. ICIP'97, Santa Barbara, CA, pp. 9□ 12, 1997.
3. A. Piva, M. Barni, F. Bartolini, V. Cappellini, "Threshold Selection for Correlation-Based Watermark Detection", Proceedings of COST 254 Workshop on Intelligent Communications, L'Aquila, Italy, June 4-6, 1998.
4. M. G. Kuhn, "Stirmark", available at http://www.cl.cam.ac.uk/~mgk25/stirmark/, Security Group, Computer Lab, Cambridge University, UK (E-mail: mkuhn@acm.org), 1997.
5. M. J. J. Maes and C. W. A. M. van Overveld, "Digital watermarking by geometric warping", Proc. of the ICIP'98, Chicago, Illinois, 1998.
6. J. J. K. Ó Ruanaidh and T. Pun, "Rotation, scale and translation invariant digital image watermarking", Proc. of the ICIP'97, vol. 1, pp. 536–539, Santa Barbara, California, 1997.
7. J. J. K. Ó Ruanaidh, W. J. Dowling, and F. M. Boland, "Watermarking digital images for copyright protection", IEE Proc. Vision, Image and Signal Processing, 143(4), pp. 250–256, 1996.
8. A. Herrigel, J. Ó Ruanaidh, H. Petersen, S. Pereira, T. Pun, "Secure copyright protection techniques for digital images," Proc. of the 2nd Int. Information Hiding Workshop, Portland, Oregon, 1998.
9. H. Choi, H. Kim, and T. Kim, "Robust Watermarks for Images in the Subband Domain", Proc. of The 6th IEEE International Workshop on Intelligent Signal Processing and Communication Systems (ISPACS'98), Melbourne, Australia, pp. 168□ 172, 1998.
10. D. J. Fleet and D. J. Heeger, "Embedding Invisible Information in Color Images", ICIP '97, pp.523□ 535, Santa Barbara, California, 1997.
11. N.F. Johnson, S.C. Katezenbeisser, "A Survey of Steganographic Techniques" in Information Techniques for Steganography and Digital Watermarking, S.C. Katzenbeisser et al., Eds. Northwood, MA: Artec House, Dec. 1999, pp 43-75.
12. Kamran Ahsan, Deepa Kundur. Workshop Multimedia and Security at ACM Multimedia'02, December 6, 2002.
13. Emil Frank Hembrooke. Identification of sound and like signals. United States Patent, 3,004,104, 1961, quoted in" The first 50 years of electronic watermarking ".Ingemar J. Cox, Matt L. Miller, published in the Journal of Applied Signal Processing,IEEE, 2002.
14. "USC-SIPI image database," available at http://sipi.usc.edu/services/database/Database.html.
15. Dr. M. A. Dorairangaswamy, "A Robust Blind Image Watermarking Scheme in Spatial Domain for Copyright Protection", International Journal of Engineering and Technology Vol. 1, No.3, August, 2009.
16. [A. Al-Haj, "Combined DWT-DCT Digital Image Watermarking", Journal of Computer Science3 (9): 740-746, 2007. [15] M. Calagna, H. Guo, L. V. Mancini and S. Jajodia, "A Robust Watermarking System Based on SVDCompression", Proceedings of ACM Symposium on Applied Computing (SAC2006),Dijon, France, pp. 1341-1347, 2006.
17. F. Cayre, C. Fontaine and T. Furon, "Watermarking security: theory and practice", Signal Processing, IEEE Transactions on, vol. 53, no. 10, pp. 3976–3987, Oct. 2005.
18. P. Taoaand and A. M. Eskicioglu, "A robust multiple watermarking scheme in the Discrete Wavelet Transform domain", Internet Multimedia Management Systems Proceedings of the SPIE, Volume 5601, pp. 133-144 (2004).

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19. Pradhan, C., Rath, S., Bisoic, and A. K., "Non Blind Digital Watermarking Technique Using DWT and Cross Chaos", Journal of Procedia Technology, vol. 6, pp. 897- 904, 2012.
20. Keyvanpour, M., Bayat, F. M., "Robust Dynamic Block-Based Image Watermarking in DWT Domain", Journal of Procedia Computer Science, vol. 3, pp. 238-242, 2011.

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| **6.** | **Authors:** | **Mohammad Sharear Kabir, Tamzid Ibn Minhaj, Ehsan Ahmed Ashrafi, Md. Maruf Hossain** |
| | **Paper Title:** | **Influence of Sintering Routes on the Structure and Indentation Hardness of Nano α-$Al_2O_3$ Particles** |

**Abstract:** In this study, the influence of single stage and double stage sintering routes on the microstructure and indentation hardness of nanoscale α-Al2O3 particles have been investigated. The nanoscale alumina particles were compacted by Uniaxial pressing technique. Sintered nanoscale α-Al2O3 particles have been shown to have excellent mechanical properties to be used in the manufacture of nanotubes and nanowires. Among the sintering routes, α-Al2O3 ceramic particles sintered by double stage sintering route showed comparatively higher resistance to indentation than single stage sintering route. The densification achieved by double stage sintering route is higher than single stage sintering route. Based on scanning electron microscope images, the microstructure of samples sintered by double stage sintering route contained less porosity than conventional/ single stage sintering route. The increase in hardness achieved by double stage sintering route can be attributed to higher densification and suppressed grain growth during final stage sintering.

**Keywords:** α-Al2O3, Uniaxial pressing, indentation hardness, double stage sintering route, single stage sintering route.

**References:**

1. W.D. Kingery, H.K. Bowen, D.R. Uhlmann, Introduction to Ceramics, Wiley, New York, 1976.
2. M.N. Rahaman, Ceramic Processing and Sintering, M. Dekker, New York, 2003.
3. N.J. SHAW, R.J. BROOK, Structure and Grain Coarsening during the Sintering of Alumina J Am Ceram Soc. 69 (1986) page 107-110.
4. R.M. German, Sintering Theory and Practice, Wiley, New York, 1996.
5. R. Vila, E. R. Hodgson. In-beam dielectric properties of alumina at low frequencies. J. Nucl. Mater. V., 283-287, 903-606 (2000).
6. L. Jiang, P. Yubai, X. Changshu, G. Qiming, and J. Jingkun, "Low temperature synthesis of ultrafine α-Al2O3 powder by a simple aqueous sol–gel process," Ceramics International, vol. 32, no. 5, pp. 587–591, 2005.
7. G. M. Ming, J. Z. Ying, and L. X. Zi, "A new route to synthesis of γ-alumina nanorods," Materials Letters, vol. 61, no. 8-9, pp. 1812–1815, 2007.
8. D. G. Wang, F. Guo, J. F. Chen, H. Liu, and Z. Zhang, "Preparation of nano aluminium trihydroxide by high gravity reactive precipitation," Chemical Engineering Journal, vol. 121, no. 2-3, pp. 109–114, 2006.
9. M. Hasmaliza, S. S. How, and S. Rahayu, "α-Alumina nanoparticle synthesize through sol-gel isopropoxide system," Proceedings of the International Conference on Applied Production Technology (APT '07), Beijing, China, 2007.
10. L. T. Geik, Y. L. Kong, and A. K. M. Wan, "Synthesis and characterization of sol-gel alumina nanofibers," Journal of Sol-Gel Science and Technology, pp. 1–17, 2007.
11. E. Yalamaç, Antonio Trapani, Sedat Akkurt. "Sintering and microstructural investigation of gamma-alpha alumina powders." Engineering Science and Technology, an International Journal 17 (2014) 2-7
12. K. Wefers, C. Misra, Oxides and Hydroxides of Aluminum, ALCOA Technical Paper No. 19, Rev. ALCOA Labs, 1987.
13. X. Yang, A.C. Pierre, D.R. Uhlmann, J. Non-Cryst. Sol. 100 (1988) 331, http://dx.doi.org/10.1016/0022-3093(86)90142-0.
14. S.D. Skrovanek, R.C. Bradt, Microhardness of a grain–grain-size Al2O3, J. Am. Ceram. Soc. 62 (3–4) (1979) 215–216.
15. R.W. Rice, C.C. Wu, F. Borchelt, Hardness–Grain-size relations in ceramics, J. Am. Ceram. Soc. 77 (10) (1994) 2539–2553.
16. A. Krell, P. Blank, Grain size dependence of hardness in dense submicrometer alumina, J. Am. Ceram. Soc. 78 (4) (1995) 1118–1120.
17. P. Chantikul, S.J. Bennison, B.R. Lawn, Role of grain size in the strength and R-curve properties of alumina, J. Am. Ceram. Soc. 73 (8) (1990) 2419–2427.
18. J. Seidel, N. Claussen, J. Ro¨del, Reliability of alumina ceramics: effect of grain size, J. Eur. Ceram. Soc. 15 (1995) 395–404.
19. R.W. Rice, Review ceramic tensile strength-grain size relations: grain sizes, slopes, and branch intersections, J. Mater. Sci. 32 (1997) 1673–1692.
20. Y.T. O, J.B. Koo, K.J. Hong, J.S. Park, D.C. Shin, Effect of grain size on transmittance and mechanical strength of sintered alumina, Mater. Sci. Eng. A 374 (2004) 191–195.
21. R.S. Roy, H. Guchhait, A. Chanda, D. Basu, M.K. Mitra, Improved sliding wear-resistance of alumina with sub-micro grain size: a comparison with coarser grained material, J. Eur. Ceram. Soc. 27 (2007) 4737–4743.
22. T. Senda, E. Yasuda, M. Kaji, R.C. Bradt, Effect of grain size on the sliding wear and friction of alumina at elevated temperatures, J. Am. Ceram. Soc. 82 (6) (1999) 1505–1511.
23. A. Muchtar, L.C. Lim, Indentation fracture toughness of high purity submicron alumina, Acta Mater. 46 (5) (1998) 1683–1690.
24. R. Apetz, M.P.B. Bruggen, Transparent alumina: a light-scattering model, J. Am. Ceram. Soc. 86 (3) (2003) 480–486.
25. A. Krell, P. Blank, H. Ma, T. Hutzler, M. Nebelung, Processing of highdensity submicrometer Al2O3 for new applications, J. Am. Ceram. Soc. 86 (4) (2003) 546–553.
26. B.N. Kim, K. Hiraga, K. Morita, H. Yoshida, Spark plasma sintering of transparent alumina, Scripta Mater. 57 (7) (2007) 607–610.
27. S. Chang, R.H. Doremus, L.S. Schadler, R.W. Siegel, Hot-pressing of nano-size alumina powder and the resulting mechanical properties, Int. J. Appl. Ceram. Technol. 1 (2) (2004) 172–179.
28. Z. Shen, M. Johnson, Z. Zhao, M. Nygren, Spark plasma sintering of alumina, J. Am. Ceram. Soc. 85 (8) (2002) 1921–1927.
29. I.W. Chen, X.H. Wang, Sintering dense nanocrystalline ceramics without final-stage grain growth, Nature 404 (2000) 168–171.
30. X.H. Wang, P.L. Chen, I.W. Chen, Two-step sintering of ceramics with constant grain-size. I. Y2O3, J. Am. Ceram. Soc. 89 (2) (2006) 431–437.
31. P. Dura´n, F. Capel, J. Tartaj, C. Moure, A strategic two-stage lowtemperature thermal processing leading to fully dense and fine-grained doped-ZnO varistors, Adv. Mater. 14 (2) (2002) 137–141.
32. P.C. Yu, Q.F. Li, J.Y.H. Fuh, T. Li, L. Lu, Two-stage sintering of nanosized yttria stabilized zirconia process by powder injection moulding, J. Mater. Process. Tech. 192-193 (2007) 312–318.

33. J. Binner, K. Annapoorani, A. Paul, I. Santacruz, B. Vaidhyanathan, Dense nanocrystructured zirconia by two stage conventional/hybrid microwave sintering, J. Eur. Ceram. Soc. 28 (5) (2007) 973–977.
34. K. Bodisˇova´, P. Sˇ ajgalı´k, D. Galusek, P.Sˇ vanca´rek, Two-stage sintering of alumina with submicrometer grain size, J. Am. Ceram. Soc. 90 (1) (2007) 330–332.
35. Y.I. Lee, Y.W. Kim, M. Mitomo, Effect of processing on densification of nanostructured SiC ceramics fabricated by two-step sintering, J. Mater. Sci. 39 (2004) 3801–3803.
36. ASTM C372-73.
37. BARTOSZ WÓJTOWICZ, WALDEMAR PYDA. "Two step sintering and related properties of 10 vol.% ZrO2-Al2O3 composites derived from filter and cold isostatic pressing". MATERIALY CERAMICZNE /CERAMIC MATERIALS/, 63, 4, (2011), 814-819.
38. Ralf Reidel, I-Wei Chen. Ceramics Science and Technology, Synthesis and Processing. John Wiley & Sons, Dec 12, 2011, pp. 452-453