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Department: Physics

Qualification: Ph.D. (Science), Jadavpur University

Designation: Assistant Professor

Area of Specialization: Nanoindentation and Tribology (Biomaterials), Nanocomposites, Thin Films

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Teaching Experience: 23/12/2019 to till date

Research Extension: Application of Plasma for stain removal

Awards: DST Woman Scientist Award

Research Projects: Calcium silicate-based nanocomposites for endodontic applications (Completed)

Important Publications:

JOURNALS

1. **N. Biswas** et al. "Loading rate effect on nanohardness of human enamel", Indian Journal of Physics, 2012, 86, 569-574.
2. **N. Biswas** et al. "Nanomechanical Properties of Dip Coated Indium Tin Oxide Films on Glass", Thin Solid Films, 2015, 579, 21-29
3. **N. Biswas** et al. "Phase pure, high hardness, biocompatible calcium silicates with excellent anti-bacterial and biofilm inhibition efficacies for endodontic and orthopaedic applications," Journal of Mechanical Behavior of Biomedical Materials, 2018, 86, 264-283.
4. **N. Biswas** et al. "Synthesis and structure determination of calcium silicate-cellulose nanoglass biocomposite", Journal of American Ceramic Society, 2019, 103, 2868-2879
5. **N. Biswas** et al. "Orientational effect in nanohardness of functionally graded microstructure in enamel", Journal of the Institute of Engineers (India): Series D, 2012, 93, 87-95.
6. **N. Biswas** et al. "Micro-pop-in issues in nanoscale contact deformation resistance of tooth enamel", ISRN Biomaterials, 2013, 545791.
7. **N. Biswas** et al. "Mechanical Properties of Enamel Nanocomposite", ISRN Bio-Materials, 2013, 253761.
8. S. Ghosh, K.S. Pal, A.K. Mondal, **N. Biswas** et al. "Cordierite based glass ceramic glazed floor tiles by microwave processing" Materials Characterization, 95, 192-200.

BOOK CHAPTERS

Book : Nanoindentation of Brittle Solids

Published: June 25, 2014 by CRC Press, Taylor and Francis Group

Author(s): Arjun Dey, Anoop Kumar Mukhopadhyay

1. Chapter 3: Brief history of indentation
N. Biswas et al. pp 23-30.

2. Chapter 4: Hardness and Elastic modulus
N. Biswas et al. pp 31-38.
3. Chapter 5: Nanoindentation: Why at All and Where?
A. Dey, P. Bandyopadhyay, **N. Biswas** et al. pp 39-44.
4. Chapter 9: Materials and Measurement issues
A. Dey, R. Chakraborty, P. Bandyopadhyay, **N. Biswas** et al. pp 63-78.
5. Chapter 42: Orientational effect in nanohardness of tooth enamel
N. Biswas et al. pp 315-320.
6. Chapter 43: Slow or fast contact: Does it matter for enamel?
N. Biswas et al. pp 321-326.
7. Chapter 46: Indentation size-effect (ISE) and reverse indentation size effect (RISE) in nanoindentation
A. Dey, D. Kaushik, **N. Biswas** et al. Pp 341-347
8. Chapter 47: Pop-in issues in nanoindentation
R. Chakraborty, A. Dey, M. Bhattacharya, **N. Biswas** et al. pp 349-357
9. Chapter 48: Effect of loading rate on nanoindentation response of brittle solids.
R. Chakraborty, A. Dey, **N. Biswas** et al. pp 359-364

Book titled: Nanoindentation of Natural Materials: Hierarchical and Functionally Graded Microstructures

Published: September 24, 2018 by CRC Press, Taylor and Francis Group

Author(s): Arjun Dey, Anoop Kumar Mukhopadhyay

1. Chapter 1: Basics of Hierarchical and Functionally Graded Structures and Mechanical Characterization by Nanoindentation: A Paradigm Shift for Nano/Microstructural Length Scale.
A. Dey, D. Porwal, **N. Biswas** et al.
2. Chapter 3: Nanoindentation of Teeth: A Hard but Tough Hybrid Functionally Graded Composite
N. Biswas et al. pp 59-81.
3. Chapter 4: Fracture Toughness of Enamel Region: Role of DEJ and Modeling of Fracture Toughness
N. Biswas et al. pp 83-101.
4. Chapter 5: Nanoindentation Creep of Enamel and Dentin Tissues.
N. Biswas et al. pp 103-123.

CONFERENCE PUBLICATIONS

1. A. Dey, **N. Biswas**, et al. "Anisotropy in Young's Modulus of Human Cortical Bone", International Conference on Biomaterials and Implants: Prospects and Possibilities in The New Millenium, July 21-23, 2011(Kolkata, India), pp-91.
2. **N. Biswas** et al. "Improvement in Nanohardness of Human Enamel", Workshop on Mechanical Behaviour of Systems at Small Length Scales-3, September 18-21, 2011 (Trivandrum, India), pp-41.
3. **N. Biswas** "Rate effects in Nanoscale Contact Deformation of Human Dental Enamel?", Young Scientists' Colloquium-2012, August 8, 2012, organized by Materials Research Society of India (MRSI), India.
4. **N. Biswas** "Does Loading Rate Improve the Nanoscale Contact Deformation Resistance of Human Dental Enamel?", p. 145 in Book of Abstracts, Research Scholar Day, July 18, 2012, organized by CSIR-CGCRI, India.
5. **N. Biswas** and A.K. Mukhopadhyay, "Micro-pop-in issues in Contact Deformation Resistance of Human Enamel at Small Length Scale", ISJPS-2013 will be held at Indian Institute of Technology Kharagpur during February 25-27, 2013'
6. **N. Biswas** and A. K. Mukhopadhyay, "Deformation behaviour of Human Dental Enamel at Small Length Scale", Fourth International Workshop on "Mechanical Behaviour of Systems at Small Length Scales-4", February, 24-28, 2013, Karnataka, India.
7. **N. Biswas**, "Nanomechanical behavior of a Natural Nanocomposite" p. 59 in Book of Abstracts, Research Scholar Day, August 20, 2013, organized by CSIR-Central Glass & Ceramic Research Institute, India (Poster Presentation).
8. **N. Biswas** et al." Nanoindentation studies on Human Dentin" pp 340-346 (2014) in ICEMP 2014 proceedings contributory papers, CSIR-IMMR, India

9. **N. Biswas** et al. “Nanoindentation studies on Human Dentin” pp 280-286 (2014) in ICEMP 2014 proceedings contributory papers, CSIR-IMMR, India.
10. **N. Biswas** “Nanoscale contacts in human tooth enamel” pp 7 (2014) in Vol 3, Book of Abstracts, Research Scholar Day, August 20, 2014, organized by CSIR-CGCRI.
11. **N. Biswas**, S. D. Acharya, D. Kaushik, M. Bhattacharya and A. K. Mukhopadhyay, “Contact Issues at Microstructural Length Scale of AlN-SiC Composites” accepted for oral presentation, page no. 80 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
12. **N. Biswas** et al. “Development of High Toughness AlN-SiC Ceramic Composites” page no. 85 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
13. **N. Biswas** et al. “Advanced hybrid polymeric nano-bio-composite” accepted for oral presentation, page no. 96 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
14. **N. Biswas** et al. “Micromechanics prediction of Young’s modulus of enamel nanocomposite” page no. 133 in the book of abstracts at First International Conference on Emerging Materials: Characterization & Application (EMCA-2014), December 04-06, 2014, Kolkata, India.
15. **N. Biswas** et al. “Synthesis of a Calcium Silicate base Material for Endodontic Application”, 2nd International Conference in Alumina and Other Functional Ceramics (AOFC-2017) held from 15th-17th February at CSIR-CGCRI, Kolkata, 2017.
16. **N. Biswas** et al. “Synthesis of a calcium silicate based endodontic material”, Conference on Frontiers of Material Science and Photonics: Issues and Developments (NCFMSP-2020) held from 5th-6th March 2020 at Sidho-Kanho Birsha University, Purulia, 2020.

1. A. Dey, **N. Biswas**, S. Kundu, H. Chakraborty, A. K. Mukhopadhyay and N. R. Bandyopadhyay, "Anisotropy in Young's Modulus of Human Cortical Bone", International Conference on Biomaterials and Implants: Prospects and Possibilities in The New Millenium, July 21-23, 2011(Kolkata, India), pp-91.
2. **N. Biswas**, A. Dey, S. Kundu, H. Chakraborty and A. K. Mukhopadhyay, "Improvement in Nanohardness of Human Enamel", Workshop on Mechanical Behaviour of Systems at Small Length Scales-3, September 18-21, 2011 (Trivandrum, India), pp-41.
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5. **N. Biswas** and A.K. Mukhopadhyay, "Micro-pop-in issues in Contact Deformation Resistance of Human Enamel at Small Length Scale", ISJPS-2013 will be held at Indian Institute of Technology Kharagpur during February 25-27, 2013 (presented)
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8. **N. Biswas**, S. Kundu, A. Dey and A. K. Mukhopadhyay, "Nanoindentation studies on Human Dentin" pp 340-346 (2014) in ICEMP 2014 proceedings contributory papers, CSIR-Institute of Minerals and Materials Research, India
9. **N. Biswas**, S. Sarkar, P. Ghosh, D. Moitra, P. K. Biswas and A. K. Mukhopadhyay, "Nanoindentation studies on Human Dentin" pp 280-286 (2014) in ICEMP 2014 proceedings contributory papers, CSIR-Institute of Minerals and Materials Research, India (Oral Presentation)
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13. **N. Biswas**, L. Khurana and A. K. Mukhopadhyay, "Advanced hybrid polymeric nano-bio-composite" accepted for oral presentation, page no. 96 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.

14. M. Bhattacharya, S. D. Acharya, **N. Biswas**, D. Kaushik and A. K. Mukhopadhyay, “Does the Rate of Contact Matter in Ceramic Microcomposites?” accepted for oral presentation, page no. 81 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
15. A. Samanta, A. Sinha, S. Sarapure, A. Dey, D. Chanda, P. S. Das, B. Bera, R. Chakraborty, P. Bandyopadhyay, **N. Biswas**, M. Bhattacharya and A. K. Mukhopadhyay, “Alumina Lanthanum Phosphate Composites for Structural Applications” accepted for oral presentation, page no. 82 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
16. A. Samanta, A. Sinha, S. Sarapure, A. Dey, D. Chanda, P. S. Das, B. Bera, R. Chakraborty, P. Bandyopadhyay, **N. Biswas**, M. Bhattacharya and A. K. Mukhopadhyay, “Development of a Tough Matrix / Weak Interface Ceramic Nanocomposite” accepted for oral presentation, page no. 72 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
17. D. K. Chanda, A. Sinha, S. Sarapure, A. Dey, A. Samanta, R. Chakraborty, P. S. Das, M. Bhattacharya, P. Bandyopadhyay, **N. Biswas**, B. Bera and A. K. Mukhopadhyay, “Development of Zirconia Toughened Alumina Nanocomposites” accepted for oral presentation, page no. 91 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
18. P. S. Das, S. Sarapure, A. Sinha, A. Dey, A. Samanta, D. K. Chanda, R. Chakraborty, M. Bhattacharya, **N. Biswas**, P. Bandyopadhyay, B. Bera and A. K. Mukhopadhyay, “Role of a Tough Layer in Ceramic Composite Design” accepted for oral presentation, page no. 94 in the book of abstracts at INCCOM-13, ISAMPE National Conference on Composites, November 14 - 15, 2014, VSSC, Thiruvananthapuram, India.
19. **N. Biswas**, S. K. Dalui, A. Samanta and A. K. Mukhopadhyay, “Micromechanics prediction of Young’s modulus of enamel nanocomposite” accepted as a poster presentation, page no. 133 in the book of abstracts at First International Conference on Emerging Materials: Characterization & Application (EMCA-2014), December 04-06, 2014, Kolkata, India.
20. “Synthesis of a Calcium Silicate base Material for Endodontic Application”, **N. Biswas**, A. Samanta, J. Ghosh and A. K. Mukhopadhyay, 2nd International Conference in Alumina and Other Functional Ceramics (AOFC-2017) held from 15th-17th February at CSIR-CGCRI, Kolkata, 2017.
21. “Synthesis of a calcium silicate based endodontic material”, **N. Biswas**, Aniruddha Samanta, Soumik Podder, Jiten Ghosh and Anoop Kumar Mukhopadhyay, accepted as oral presentation, page no. 47 in the book of abstracts at Proceedings of National Conference on Frontiers of Material Science and Photonics: Issues and Developments (NCFMSP-2020) held from 5th-6th March 2020 at Sidho-Kanho Birsha University, Purulia