

SASWATA BHATTACHARYA

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Department of Materials Science and Metallurgical Engineering
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DOB: 29.11.1975

EDUCATION

Doctor of Philosophy (Materials Engineering, 2008)

Awarded by Faculty of Engineering, Indian Institute of Science, Bangalore 560012, INDIA. Thesis: Evolution of Multivariant Microstructures with Anisotropic Misfit: A Phase Field Study

Master of Science (Eng.) (Metallurgy, 2002)

Awarded by Faculty of Engineering, Indian Institute of Science, Bangalore 560012, INDIA. Thesis: Ternary Spinodal Decomposition: Effect of Interfacial Energy

Bachelor of Technology (Ceramic Technology, 1999)

Awarded by Government College of Engineering and Ceramic Technology, Calcutta University, Kolkata-700010, West Bengal, INDIA, First class with honors.

PROFESSIONAL EXPERIENCE	
Assistant Professor Department of Materials Science and Metallurgical Engineering	July 2013 - January 2019
Materials Scientist Materials Modeling and Tribology Lab General Electric (GE) India Technology Center Bangalore - 560066, INDIA	September 2011 - June 2013
Post-Doctoral Fellow Research Associate Department of Materials Science and Engineering Penn State University University Park, PA-16802, USA	July 2008 - July 2011 July 2011 - August 2011

RESEARCH INTERESTS

- Phase transformations in alloys and oxides, Phase-field modeling, Discrete dislocation dynamics
- Integration of mesoscale models of microstructural evolution with deformation mechanics models (crystal plasticity, discrete dislocation dynamics, damage and fracture)
- Prediction of process-microstructure-property relations. Development and implementation of high-performance integrated computational materials engineering (ICME) tools for materials design

EXPERTISE

- Development of phase-field models and their numerical implementation,

- Discrete dislocation dynamics simulations of plasticity and creep, computational crystal plasticity models of deformation
- HPC skills: Implementation of OpenMP, MPI and GPU-based methods

LIST OF PUBLICATIONS

Journals

1. “Phase field modeling of fracture in Quasi-Brittle materials using natural neighbor Galerkin method”, P. Kasirajan, *S. Bhattacharya*, A. Rajagopal, J N Reddy, *Comp. Methods in Appl. Mech. And Eng.*, 366, 113019, 2020
2. “Back-Stress and Its Evolution during Primary Creep in Particle Strengthened Nickel Superalloys”, Sanket Sarkar, Yan Gao, Shenyang Huang, *Saswata Bhattacharya*, Swapnil Patil, Ramkumar Oruganti, *Crystals*, 10(4), 306, 2020
3. “A phase-field study of elastic stress effects on phase separation in ternary alloys”, Sandeep Sugathan, *Saswata Bhattacharya*, *Computational Materials Science*, 172(1), 109284, 2020
4. “Tunable polarization components and electric field induced crystallization in polyvinylidene fluoride: A piezo polymer”, Ronit Ganguly, Soumya Bandyopadhyay, Kumaraswamy Miriyala, Vijayabhaskar Gunasekaran, *Saswata Bhattacharya*, Amit Acharyya, Ranjith Ramadurai, *Polymer Crystallization*, 2(1), e10027, 2019
5. “Realization of rhombohedral, mixed, and tetragonal like phases of BiFeO₃ and ferroelectric domain engineering using a strain tuning layer on LaAlO₃(001) substrate”, MM Sajmohan, Soumya Bandyopadhyay, Tushar Jogi, *Saswata Bhattacharya*, R. Ramadurai, *Journal of Applied Physics*, 125(1), 012501, 2019.
6. “Phase-Field Modelling of Evolution of Compact Ordered Precipitates in Ternary Alloy Systems”, Sandeep Sugathan, *Saswata Bhattacharya*, *MRS Advances*, 4 (25-26), 1457-1463, 2019
7. “Low temperature synthesis and characterization of single phase multi-component fluorite oxide nanoparticle sols”, M. Anandkumar, *Saswata Bhattacharya*, A S Deshpande, *RSC Advances*, 9, 26825-26830, 2019
8. “Enhancing elevated temperature strength of copper containing aluminium alloys by forming L12Al3Zr precipitates and nucleating θ 00 precipitates on them”, Surendra Kumar Makineni, Sandeep Sugathan, Subhashish Meher, Rajarshi Banerjee, *Saswata Bhattacharya*, Subodh Kumar, Kamanio Chattopadhyay, *Scientific Reports*, 7(1), 11154, 2017
9. “A phase-field study of domain dynamics in ferroelectric BCT-BZT system”, Soumya Bandyopadhyay, Tushar Jogi, Kumaraswamy Miriyala, Ranjith Ramadurai, and *Saswata Bhattacharya*, *MRS Advances*, 2016, available on CJO2016. doi:10.1557/adv.2016.384.
10. “Phase-field modeling of electrochemical phenomena”, *Saswata Bhattacharya*, Soumya Bandyopadhyay, Abhik Choudhury, *Journal of the Indian Institute of Science* 96.3 (2016): 257-268.
11. “Anisotropic Li intercalation in Li_xFePO₄ nano-particle: a spectral smoothed boundary phase-field model”, L Hong, L Liang, *S Bhattacharyya*, W Xing, L -Q Chen, *Physical Chemistry Chemical Physics*, 18, 9537, 2016.
12. “Evolution of Interfacial Dislocation Networks in Particle-Strengthened Alloy Systems During High Temperature Creep: A Discrete Dislocation Dynamics Study”, Tushar Jogi and *Saswata Bhattacharya*, *Transactions of the Indian Institute of Metals*, 69, 507, 2016.

13. "An integrated fast Fourier transform based phase-field and crystal plasticity approach to model recrystallization of three dimensional polycrystals", L Chen, J Chen, RA Lebensohn, YZ Ji, TW Heo, **S Bhattacharyya**, K Chang, S Mathaudhu, ZK Liu, L-Q Chen, *Computer Methods in Applied Mechanics and Engineering*, 285, 829, 2015.
14. "Effect of epitaxial strain on phase separation in thin films", A Lahiri, TA Abinandanan, MP Gururajan, **S Bhattacharyya**, *Philosophical Magazine Letters*, 94, 702, 2014.
15. "Role of polaron hopping in leakage current behavior of a SrTiO₃ single crystal", Y Cao, **S Bhattacharyya**, J Shen, CA Randall, L-Q Chen, *Journal of Applied Physics*, 114, 224102, 2013
16. "A phase-field model for elastically anisotropic polycrystalline binary solid solutions", Tae Wook Heo, **Saswata Bhattacharyya** and Long-Qing Chen, *Philosophical Magazine*, 93, 1468, 2013.
17. "Nonlinear phase-field model for electrode-electrolyte interface evolution", Linyun Liang, Yue Qi, Fei Xue, **Saswata Bhattacharyya**, Stephen J Harris, and Long-Qing Chen, *Physical Review E*, 86, 051609, 2012.
18. "Effective elastic properties of polycrystals based on phase-field description", G. Sheng, **S Bhattacharyya**, H. Zhang, K. Chang, S. L. Shang, S. N. Mathaudhu, Z. K. Liu and L.Q. Chen, *Materials Science and Engineering: A*, 554, 67, 2012.
19. "Elastic solutions with arbitrary elastic inhomogeneity and anisotropy", J.J. Wang, **Saswata Bhattacharyya**, Q. Li, T. W. Heo, X. Q. Ma and L. Q. Chen, *Philosophical Magazine Letters*, 92, 327, 2012.
20. "A Spectral Iterative Method for the Computation of Effective Properties of Elastically Inhomogeneous Polycrystals", **Saswata Bhattacharyya**, T. W. Heo, K. Chang, and L. Q. Chen, *Communications in Computational Physics*, 11(3), 726, 2012.
21. "A phase-field study of strain energy effects on solute-grain boundary interactions", T. W. Heo, **Saswata Bhattacharyya** and L. Q. Chen, *Acta Materialia*, 59(20), 7800, 2011.
22. "A phase-field model of stress effect on grain boundary migration", **Saswata Bhattacharyya**, T. W. Heo, K. Chang and L. Q. Chen, *Modelling and Simulation in Materials Science and Engineering*, 19(3), 035002, 2011.
23. "Exploring Topological Defects in Epitaxial BiFeO₃ Thin Films", R. K. Vasudevan, Y. C. Chen, H. H. Tai, N. Balke, P. P. Wu, **Saswata Bhattacharyya**, L. Q. Chen, Y. H. Chu, I. N. Lin, S. V. Kalinin, V. Nagarajan, *ACS Nano*, 5(2), 879, 2011.
24. "Watching domains grow: In-situ studies of polarization switching by combined scanning probe and scanning transmission electron microscopy", H. J. Chang, S. V. Kalinin, S. Yang, P. Yu, **Saswata Bhattacharyya**, P. P. Wu, N. Balke, S. Jesse, L. Q. Chen, R. Ramesh, S. J. Pennycook, A. Y. Borisevich, *Journal of Applied Physics*, 110(5), 052014, 2011.
25. "A phase-field model for deformation twinning", Tae Wook Heo, Yi Wang, **Saswata Bhattacharyya**, Xin Sun, Shenyang Hu, Long-Qing Chen, *Philosophical Magazine Letters*, 91, 110, 2011.
26. "Correlated polarization switching in the proximity of a 180 domain wall", Vasudeva Rao Aravind, A. N. Morozovska, **Saswata Bhattacharyya**, D. Lee, S. Jesse, I. Grinberg, Y. L. Li, S. Choudhury, P. Wu, K. Seal, A. M. Rappe, S. V. Svezhnikov, E. A. Eliseev, S. R. Phillpot, L.Q. Chen, Venkatraman Gopalan and S. V. Kalinin, *Physical Review B*, 82, 0241111, 2010.
27. Evolution of multivariant microstructures with anisotropic misfit: A phase field study", **Saswata Bhattacharyya** and T. A. Abinandanan, *Acta Materialia*, 57, 646, 2009.
28. "Flow kinetics in porous ceramics: Understanding with non-uniform capillary models", Debdutt Patro, **Saswata Bhattacharyya** and Vikram Jayaram, *Journal of the American Ceramic Society*, 90, 3040,

2007.

29. "Phase separating bulk metallic glass: A hierarchical composite", Byung Joo Park, Hye Jung Chang, Do Hyang Kim, Won Tae Kim, Kamanio Chattopadhyay, T. A. Abinandanan and **Saswata Bhattacharyya**, Physical Review Letters, 96, 245503, 2006.
30. "A study of phase separation in ternary alloys", **Saswata Bhattacharyya** and T. A. Abinandanan, Bulletin of Materials Science, 26, 193, 2003.

Conference Proceedings

1. "Numerical Simulation of Grain Growth by Phase Field Method: An Efficient Algorithm", A. K. Verma, A. R. Chintla, P. Ghosh, S. Chandra, Sandeep Sugathan and **Saswata Bhattacharya**, Thermo-Mechanical Simulation and Processing of Steels SimPro 2016, Steel Authority of India Limited, RDCIS, Ranchi, Publishers: Viva Books Private Ltd, ISBN 9789385919862.
2. "Phase-field model of diffusional phase transformations in elastically inhomogeneous polycrystals", Tae Wook Heo, **Saswata Bhattacharyya** and Long-Qing Chen, Solid State Phenomena, 172-174, 2011, pp. 1084 - 1089.
3. "A Monte Carlo study of interfacial properties of phase separating alloys", **Saswata Bhattacharyya**, Ferdinand Haider and T. A. Abinandanan, Proceedings of an International Conference on Solid-Solid Phase Transformations in Inorganic Materials 2005, v 2, 2005, pp. 705 – 714.

TEACHING EXPERIENCE (Courses taught)

- Computational Methods in Materials Science
- Thermodynamics and Kinetics of Materials
- Metallic Materials
- Introduction to Micromechanics of Solids
- Rate Phenomena in Process Modelling

Training courses and workshops

1. Certificate course on "Micromechanics: fundamental concepts and applications in the study of microstructural evolution" at TATA Steel
2. NRC-M Lectures on Phase-field modeling and its applications" at IISc, Bangalore
3. NRC-M Lecture on Examples of phase-field modeling in ICME" at IISc, Bangalore