# RITWIK BASU, PhD

## Personal Info


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02 Sep 1978

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## Languages

English

Bengali

Hindi

## Professional Summary

Experienced *Materials Science Researcher* and *Academic Personnel* with proven multidisciplinary & international experience in Applied Research and Development, Materials Processing and Characterization, Materials Testing, Design & Fabrication of prototypes.

## Skill Highlights

**RESEARCH SKILLS**

- Expert in the analysis of process-structure-property relationships in metal and alloy systems.
- Adept at materials selection, metallography and sample preparation, microstructure characterization using XRD and electron microscopy techniques (EBSD and EDS).
- Result-oriented researcher with publications in >20 peer-reviewed articles in key areas which include deformation and phase transformation, hydrogen induced cracking, dissimilar welding, solidification cracking in weld, friction stir welding.

**ACADEMIC SKILLS**

- Exceptionally seasoned and dedicated teacher with excellent presentation skills and superior critical thinking abilities.
- Well-versed in teaching courses on materials science and engineering, manufacturing processes at the college and research level.
- Resourceful project supervisor who directs and motivates students to work on practical metallurgical problems of high research value.

**VOCATIONAL SKILLS**

- Experienced and trained in the Swiss-Vocational system to the highest level of skills in metal fabrication and welding.
- Proficient in pilot equipment design and drafting (CAD), fabrication and assembly support.
- Highly trained in setting up and operating arc welding (GMAW, SMAW, FCAW, GTAW) and plasma cutting equipment.
- Skilful at reading welding procedure specification sheets, technical drawings and blueprints for production of components.

**IT & COMPUTING SKILLS**

**Basic IT:** MS Office (mainly, Word, Excel, PowerPoint), Adobe package, video recording & editing.

**Special Scientific & Engineering Programs:** Origin, Engauge Digitizer, ImageJ, AutoCAD, SolidWorks, EBSD Data post-processing tools (*Channel 5* and *TSL OIM Analysis 4.6 and 5.3*), EDS Data Acquisition and Analysis (*TEAM™ EDS Software Suite* and *AZtec Release 2.2*)

## Awards and Honors

**2018 Titan Technologies, Hosur, India**
Invited for showcasing research idea in *TITATN- Tune-In 2018. (Top 10 percent of selected proposals)*

**2011 IIT Roorkee, India**
Second Prize winner in Metallography contest in the Event *Microstructure 2011*

**2011 BARC, Mumbai, India**
Second Prize winner in poster presentation in the Annual Meeting of Electron Microscopy Soc. India- *EMSI 2010*

## Guest Talks

**2020 IIT Bombay, India**
Guest Lecture on *Understanding Plastic Deformation from Manufacturing Engineering Perspective*
*Convener— Prof. I. Samajdar*

**2020 Bharat Forge R&D, Pune, India**
Guest Lecture on *EBSD Techniques and Applications in Process Engineering*
*Convener— Dr. RK Singh, Director, KCTI*

**2020 Manipal University Jaipur, India**
Invited talk on *Microstructural Engineering* at ICAMEN 2020
*Convener— Prof. R. Goyal, Head, Mech Dept, MUJ*

**2017 Manipal University KA, India**
Invited Talk on *Renewable Energy Materials* at *ETSW Workshop 2017*
*Convener— Prof. YS Upadhyaya*

**2013 IIT Kharagpur, India**
Guest Lecture on *EBSD as a novel tool for microtexture and microstructure measurements*
*Convener— Prof. R. Mitra*

**2013 IIT Kanpur, India**
Guest Lecture on *EBSD Applications and Texture Analysis*
*Convener— Prof. K. Biswas*

## Education

**2007 –2012 Indian Institute of Technology Bombay, India**
**PhD** in Metallurgical Engineering & Materials Science
*Thesis Title: Ni-Ti Shape Memory Alloys: Microstructural Developments During Processing and their effect on recoverable strain*

**2004 –2006 Jadavpur University Kolkata, India**
**Master of Technology** in Materials Science and Technology
*Thesis Title: Synthesis and characterization of WC/Co nanocomposites through sol-gel route*

**1997 –2001 College of Engineering Nanded, India**
**Bachelor of Engineering** in Mechanical Engineering
*Project Title: Low cost Eddy current brakes for automats*

## Academic Experience

**Jan 2019 –***To Date* **Bhartiya Skill Development University, Jaipur, India**
**Position-** *Associate Professor*

- Contributing to develop a flexible skill education model in compliance with the guidelines of the ministry through curriculum development and innovation in teaching strategies
- Working hand in hand with Swiss experts for setting up state-of-the-art machines required for skill based training and education.
- Staying up to date on advances in skill training and working to continuously improve teaching and training methods.

**Aug 2016 – Dec 2019 Manipal University, Karnataka, India**
**Position-** *Assistant Professor*

- Mentored students, including directing research, projects or internships, as well as advising on career paths and higher education options.
- Employed variety of teaching techniques to encourage student engagement and cater to diverse learning modalities.
- Updated lesson plans for junior instructors and ensured lecture materials to reflect most recent technological findings.

**Mar 2015 – Jun 2016 Northcap University, Gurgaon, India**
**Position-** *Associate Professor*

- Applied innovative teaching methods to promote student learning goals.
- Mentored students and communicating internship and employment opportunities.
- Facilitated academic and research collaborations to increase number of proposal submissions for external funding.

## Additional Functions

**Mar 2019-** *To Date* **Bhartiya Skill Development University, Jaipur, India**
Head, School of Metal Construction Skills.

**Jan 2017-Dec 2018 Manipal University, Karnataka, India**
Facility In-Charge, Electron Microscopy Center, Central Instrumentation Facility.

**Nov 2015–Jun 2016 The NorthCap University, Gurgaon, India**
Deputy Dean, Industrial and Funding Agency Liaison

## Team Work & Event Management

**2019 Bhartiya Skill Development University, Jaipur, India**
Worked as a Chief Purchase Manager for *Smart India Hackathon (SIH 2019)*- A national initiative to provide engineering students a platform to solve and demonstrate innovative problems

**2014 Univ of Saskatchewan, SK, Canada**
Worked as an Arrangement Chair for organizing a *Canadian National Conference on Materials Science (CMSC-2014)*.

**2011 IIT Bombay, Mumbai, India**
Worked as a part of the 5 core member team for organizing an *International Conference on Texture of Materials (ICOTOM16)* at IIT Bombay.

**2010 IIT Bombay, Mumbai, India**
Actively involved in coordinating with various industries for fund raising a national level research scholar's symposium *Materials Research "MR-10"*.

## Research Experience

**Sep 2013 – Feb 2015** **University of Saskatchewan, SK, Canada**

**Position-** *Postdoctoral Researcher at Advanced Materials for Clean Energy group led by* ***Prof. Jerzy A Szpunar****.*

- Worked with cross-functional team in processing, microstructure and property evaluation for a wide range of advanced materials, such as Ni-Ti shape memory alloys, Ni based superalloys, pipeline steel etc.
- Worked as a Principal In-charge of the Electron Microscopy Facility. Planned and distributed time to different users.
- Supervised master and doctoral students in the organization of experimental results, design of research problems for theses and drafting manuscripts for communication.

**Jan 2007 – Jun 2012** **Indian Institute of Technology Bombay, Mumbai, India**

**Position-** *Graduate Research Assistant at the National Facility for Texture and OIM under supervision of* ***Prof. P. Pant*** *and* ***I. Samajdar****.*

- Processed Ni-Ti alloys through marforming and hot deformation routes.
- Studied the effect of marforming and hot deformation on the microstructure and texture.
- Investigated the microstructural and texture effects on the residual deformation during thermal cycling.

**Aug 2005 – Dec 2005** **Otto-von-Guericke Universitat, Magdeburg, Germany**

**Position-** *Research intern to* ***Prof. Yuri Suchorski****, Department of Physical Chemistry*

- Applied surface science methods using Field Emission Microscopy.
- Studied the kinetics of CO Oxidation on Pt nanocatalytic surfaces using a Pt field emitter tip as a model of a nanocatalyst.
- Used image processing tool to filter noise from raw images for data analysis.

## Sponsored Research Projects Accomplished

**Jun 2017 – May 2018** **R&D Centre for Iron and Steel | SAIL, Ranchi, India**

**Project Title-** *Investigation on the processing-microstructure-property relationship in dissimilar welded steels.*

**Outcome:** Demonstration of potential. Results published in Peer-reviewed journal and conference article.

## Referees

**Jerzy A. Szpunar**, Ph.D. (*Institute of Nuclear Research, Warsaw, Poland*)
Professor, Mechanical, Biomedical
Department of Mechanical Engineering, University of Saskatchewan, SK, S7N 5A9, Canada
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**Indradev Samajdar**, Ph.D. (*Drexel University, USA*)
Professor, Metallurgical Engineering & Materials Science, Indian Institute of Technology Bombay, Mumbai 400076, India
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**Prita Pant**, Ph.D. (*Cornell University, USA*)
Professor, Metallurgical Engineering & Materials Science, Indian Institute of Technology Bombay, Mumbai 400076, India
pritapant@iitb.ac.in

## Industry Experience

**Mar 2012 – Jun 2013** **Oxford Instruments India Pvt Ltd, Mumbai, India**

**Position-** *Application Specialist*

- Prepared and executed customer demonstrations and sample runs.
- Developed and documented methodologies for EBSD/EDS applications according to what was of value to current customer research needs.
- Prepared reports including data analysis for customers on the full results of demonstration or sample work.

**Mar 2004 – Sep 2004** **Dango & Dienenthal India Private Limited, Kolkata, India**

**Position-** *Mechanical Engineer- Project*

- Performed in-process inspections on different assemblies to meet assembly line schedules.
- Prepared technical documentation and 3D design and drawings using AutoCAD related to the complete assembly.
- Prepared manpower requirements for the detailed design, revised technical documentation and drawings.

**Sep 2003 – Mar 2004** **Vikrant Alloys & Forgings Limited, Kolkata, India**

**Position-** *Production Engineer*

- Performed day to day production planning in machine shop and heat treatment operations to achieve maximum production.
- Vendor development for machining of jobs and follow-up with vendors to avoid dependency.
- Installed, maintained and revised operating plans, bar charts, cycles and work sequences.

**Mar 2002 – Aug 2002** **CERATIZIT Inida Pvt Ltd, Kolkata, India**

**Position-** *Production Engineer (Trainee)*

- Assigned work load to operators & achieved daily production target.
- Performed time studies on production equipment in removing bottlenecks of production and ensure timely delivery.
- Monitored equipment downtime and implemented corrective action procedures.

# Peer-reviewed Articles

01. A.R. Anilchandra, **R. Basu**, I. Samajdar and M.K. Surappa, "Microstructure and compression behavior of chip consolidated magnesium" ***J. Mater. Res.***, vol. 27, pp. 709-719, January 2012. [DOI: 10.1557/jmr.2011.411]

02. **R. Basu**, L. Jain, B.C. Maji, M. Krishnan, K.V. Mani Krishna, I. Samajdar and P. Pant, "Origin of Microstructural Irreversibility in Ni-Ti Based Shape Memory Alloys during Thermal Cycling", ***Metall. Mater. Trans. A***, vol. 43, pp. 1277-1287, April 2012. [DOI:10.1007/s11661-011-0970-y]

03. **R. Basu**, L. Jain, B.C. Maji, M. Krishnan and I. Samajdar, "Microstructural Developments through Marforming in a Ni-Ti-Fe Shape Memory Alloy", ***Metall. Mater. Trans. A***, vol. 44, pp. 4310-4322, May 2013. [DOI: 10.1007/s11661-013-1780-1]

04. L. Zhang, J. Szpunar, **R. Basu**, J. Dong and, M. Zhang, "Influence of cold deformation on the corrosion behavior of Ni-Fe-Cr alloy 028", ***J. Alloys & Comp.***, vol. 616, pp. 235–242, July 2014. [DOI: 10.1016/j.jallcom.2014.07.099]

05. M. Eskandari, A.Z. Hanzaki, J. Szpunar, M. Yadegari, **R. Basu** and M.M. Bonab, "In-situ strain localization analysis in low density transformation-twinning induced plasticity steel using digital image correlation", ***Opt. Laser Eng.***, vol. 67, pp. 01–16, October 2014. [DOI: 10.1016/j.optlaseng.2014.10.005]

06. B.C. Maji, M. Krishnan, A. Verma, **R. Basu**, I. Samajdar and R.K. Ray, "Effect of Pre-straining on the Shape Recovery of Fe-Mn-Si-Cr-Ni Shape Memory Alloys", ***Metall. Mater. Trans. A***, vol. 46(2), pp. 639-655, November 2014. [DOI: 10.1007/s11661-014-2645-y]

07. M. Eskandari, M.A. Mohtadi-Bonab, **R. Basu**, M. Nezakat, A. Kermanpur and J.A. Szpunar, "Preferred crystallographic orientation in nano grained 316L stainless steel during martensite to austenite reversion", ***J. Mater. Eng. Perform.***, vol. 24(2), pp. 644-653, December 2014. [DOI: 10.1007/s11665-014-1340-x]

08. M.M. Bonab, J. Szpunar, **R. Basu** and M. Eskandari, "The mechanism of failure by hydrogen induced cracking in an acidic environment for API 5L X70 pipeline steel", ***Inter. J. Hydro. Energy***, vol. 40 (2), pp. 1096–1107, January 2015. [DOI: 10.1016/j.ijhydene.2014.11.057]

09. J. Podder, **R. Basu**, R.W. Evitts and R.W. Besant, "Surface morphology and microstructural characterization of KCl crystals grown in halide-sylvite brine solutions by electron backscattered diffraction techniques", ***Surf. Rev. Lett.***, vol. 22 (1), pp. 1550012 (01-08), January 2015. [DOI: 10.1142/S0218625X15500122]

10. **R. Basu**, L. Jain, B.C. Maji and M. Krishnan, "Dynamic Recrystallization in a Ni-Ti-Fe Shape Memory Alloy: Effects on Austenite-Martensite Phase Transformation", ***J. Alloys & Comp.***, vol. 639, pp.94–101, March 2015. [DOI: 10.1016/j.jallcom.2015.03.085]

11. A.A. Tiamiyu, **R. Basu**, A.G. Odeshi and J.A. Szpunar, "Plastic deformation in relation to microstructure and texture evolution in AA 2017-T451 and AA 2624-T351 aluminum alloys under dynamic impact loading", ***Mater. Sci. Eng. A***, vol. 636, pp. 379–388, April 2015. [DOI: 10.1016/j.msea.2015.03.113]

12. **R. Basu**, J. Szpunar, M. Eskandari and M.A. Mohtadi-Bonab, "Microstructural investigation on marforming and conventional cold deformation in Ni-Ti-Fe based shape memory alloys", ***Int. J. Mater. Res.*** (*formerly Z. Metallkd.*), vol. 106, pp. 852-862, April 2015. [DOI: 10.3139/146.111252]

13. **R. Basu**, M. Eskandari, L. Upadhayay, M.A. Mohtadi-Bonab and J.A. Szpunar, "A systematic investigation on the role of microstructure on phase transformation behavior in Ni-Ti-Fe shape memory alloys", ***J. Alloys & Comp.***, vol. 645, pp.213–222, May 2015. [DOI: 10.1016/j.jallcom.2015.04.224]

14. **R. Basu**, M.A. Mohtadi-Bonab, Xu Wang, M. Eskandari, and J.A. Szpunar, "Role of microstructure on phase transformation behavior in Ni—Ti—Fe shape memory alloys during thermal cycling", ***J. Alloys & Comp.***, vol. 652, pp.459–469, September 2015. [DOI: 10.1016/j.jallcom.2015.08.239]

# Peer-reviewed Articles

15. V.J. Badheka, **R. Basu**, J. Omale and J.A. Szpunar, "Microstructural aspects of TIG and A-TIG welding process of dissimilar steel grades and correlation to mechanical behavior", ***Trans. Indian Inst. Met.***, vol. 69, pp. 1765–1773, March 2016. [DOI: 10.1007/s12666-016-0836-5]

16. T. Naito, T. Yoshida, H. Mochizuki, H. Fujishiro, **R. Basu** and J.A. Szpunar, "Vortex Pinning Properties of Dense Ti-doped $MgB_2$ Bulks Sintered at Different Temperature", ***IEEE Trans. Appl. Supercond.***, vol. 26(3), pp. 01-05, April 2016. [DOI: 10.1109/TASC.2016.2531426]

17. M. Eskandari, A. Zarei-Hanzaki, M.A. Mohtadi-Bonab, Y. Onuki, **R. Basu**, A. Asghari and J.A. Szpunar, "Grain-orientation-dependent of γ–ε–α′ transformation and twinning in a super-high-strength, high ductility austenitic Mn-steel", ***Mater. Sci. Eng. A***, vol. 674, pp. 514–528, August 2016. [DOI: 10.1016/j.msea.2016.08.024]

18. L. Jain, R. Bajpai, **R. Basu**, D.S. Misra and I. Samajdar, "Delamination/Rupture of Polycrystalline Diamond Film: Defining Role of Shear Anisotropy", ***Cryst. Growth Des.***, vol. 17 (4), pp. 1514–1523, March 2017. [DOI: 10.1021/acs.cgd.6b01328]

19. L Jain, D.R. Mohapatra, **R. Basu**, D.S. Misra, A. Misra and I. Samajdar, "Effect of Interplay Between Isotropic Gases on Microstructural Evolution of Single Crystal Diamond", ***Cryst. Res. Technol.***, vol. 52 (7), pp. 01–08, July 2017. [DOI: 10.1002/crat.201700016]

20. D.K. Singh, G. Sahoo, **R. Basu**, V. Sharma and M.A. Mohtadi-Bonab, "Investigation on the microstructure—mechanical property correlation in dissimilar steel welds of stainless steel SS 304 and medium carbon steel EN 8 ", ***J. Manuf. Process***, vol. 36, pp. 281-292, November 2018. [DOI: 10.1016/j.jmapro.2018.10.018]

21. M. Eskandari, M. A. Mohtadi-Bonab, A. Zarei-Hanzaki, J. A. Szpunar and **R. Basu** "Texture and Microstructure Development of Tensile Deformed High-Mn Steel during Early Stage of Recrystallization" in ***Phys. Met. Metallogr.***, vol. 120, pp. 34-43, February 2019. [DOI: 10.1134/S0031918X19010034]

22. P.F. Rodrigues, F.M.B. Fernandes, R. Magalhães, E. Camacho, A. Lopes, A.S. Paula, **R. Basu** and N. Schelle, "Thermo-mechanical characterization of NiTi orthodontic archwires with graded actuating forces", ***J. Mech. Behav. Biomed.***, vol. 107, pp. 01-07, April 2020. [DOI: 10.1016/j.jmbbm.2020.103747]

## Conference Articles

01. **R. Basu**, L. Jain, B.C. Maji, M. Krishnan, K.V. Mani Krishna, I. Samajdar and P. Pant, "Microstructural Irreversibilities under Thermal Cycling in Ni-Ti-Fe Shape Memory Alloys", ***Mater. Sci. Forum***, vol. 702-703 pp. 888-891, Dec 2011. [DOI: 10.4028/www.scientific.net/MSF.702-703.888]

02. L. Jain, D.R. Mohapatra, R. Bajpai, **R. Basu**, D.S. Misra and I. Samajdar, "Study of Microstructures in Single Crystalline Chemical Vapor Deposited Diamond Thin Films", ***Mater. Sci. Forum***, vol. 702-703, pp. 1015-1018, Dec 2011. [DOI: 10.4028/www.scientific.net/MSF.702-703.1015]

03. L.N. Zhang, J.X. Dong, J.A. Szpunar, M.C. Zhang and **R. Basu**, "Influence of Chloride Ion and Temperature on the Corrosion Behavior of Ni-Fe-Cr Alloy 028", ***Energy Mater. 2014***, pp. 789-794, 2014. [DOI: 10.1007/978-3-319-48765-6_97]

04. **R. Basu**, J.A. Szpunar and M. Eskandari, "Marforming: A novel method for grain refinement in Ni—Ti based shape memory alloys", ***Appl. Mech. Mater.***, vol. 860, pp 46-51, December 2016. [DOI: 10.4028/www.scientific.net/AMM.860.46]

05. D.K. Singh, V. Sharma, **R. Basu** and M. Eskandari, "Understanding the effect of weld parameters on the microstructures and mechanical properties in dissimilar steel welds", ***Procedia Manuf.***, vol. 35, pp. 986-991, August 2019. [DOI: 10.1016/j.promfg.2019.06.046]

06. P.K. Jayashree, **R. Basu** and S.S. Sharma, "An electron backscattered diffraction (EBSD) approach to study the role of microstructure on the mechanical behavior of welded joints in aluminum metal matrix composites", ***Mater. Today: Proc.***, Available Online. [DOI: 10.1016/j.matpr.2020.02.319]