

# BURAK BAL

## ASSOC. PROF.

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### International Researcher IDs

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Publons / Web Of Science ResearcherID: GMW-4673-2022

ScopusID: 56181847200

Yoksis Researcher ID: 251996

### Learning Knowledge

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Doctorate  
2011 - 2015

Koc University, Makine Mühendisliği, Turkey

### Foreign Languages

English, C1 Advanced

### Dissertations

Doctorate, Utilizing Multi-Scale Modeling and Experimentation to Uncover the Role of Micro-Deformation Mechanisms on the Performance of High-Strength Steels, Koç Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği, 2015

### Academic Titles / Tasks

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Associate Professor  
2019 - Continues

Abdullah Gul University, Mühendislik Fakültesi, Makine Mühendisliği

Assistant Professor  
2016 - 2019

Abdullah Gul University, Mühendislik Fakültesi, Makine Mühendisliği

Lecturer PhD  
2016 - 2016

Kyushu Üniversitesi, Engineering , Mechanical Engineering

Research Assistant PhD  
2015 - 2016

Purdue University, Engineering , Aeronautics And Astronautics

Research Assistant  
2011 - 2015

Koc University, Faculty Of Engineering, Makine Mühendisliği

### Supported Projects

1. BAL B., BALTACIOĞLU M. F., Project Supported by Higher Education Institutions, Alüminyum 7075 Alaşımının Hidrojen Gevrekliđi Davranışına Gerinim Hızı Etkisinin Araştırılması, 2022 - Continues
2. Bal B., TÜBİTAK Project, Hidrojen Arayer Atomunun, Dislokasyon Hareketlilik Kanunlarına Etkilerinin Çok Ölçekli Modelleme Ve Deneysel Yöntemler İle Detaylı Araştırılması , 2022 - 2024
3. Bal B., TÜBİTAK Project, Comprehensive investigation of damage caused by atomic hydrogen with experimental and computational methods, 2021 - 2022
4. BAL B., Project Supported by Higher Education Institutions, Yüksek manganlı östenitik çeliklerin mekanik davranışlarının deneysel yöntemler ile belirlenmesi ve çok ölçekli modelleme yöntemi ile araştırılması, 2017 - 2019
5. BAL B., Project Supported by Higher Education Institutions, Hafif ve Kompakt Giyilebilir Robotik Diz Dış-İskeletinin Tasarımı ve Geliştirilmesi, 2017 - 2019

## Published journal articles indexed by SCI, SSCI, and AHCI

1. **A phenomenological hydrogen induced edge dislocation mobility law for bcc Fe obtained by molecular dynamics**  
Baltacioglu M. F., Kapci M. F., Schön J. C., Marian J., Bal B.  
International Journal of Hydrogen Energy, vol.87, pp.917-927, 2024 (SCI-Expanded)
2. **Hydrogen susceptibility of Al 5083 under ultra-high strain rate ballistic loading**  
Baltacioglu M. F., Mozafari F., AYDIN M., Cetin B., Oktan A. D., Teoman A., Li Y., Bal B.  
Materialprüfung/Materials Testing, vol.66, no.10, pp.1627-1643, 2024 (SCI-Expanded)
3. **Edge dislocation depinning from hydrogen atmosphere in  $\alpha$ -iron**  
Kapci M. F., Yu P., Marian J., Liu G., Shen Y., Li Y., Bal B.  
Scripta Materialia, vol.247, 2024 (SCI-Expanded)
4. **An atomistic study on the HELP mechanism of hydrogen embrittlement in pure metal Fe**  
Hasan M. S., Kapci M. F., Bal B., Koyama M., Bayat H., Xu W.  
International Journal of Hydrogen Energy, vol.57, pp.60-68, 2024 (SCI-Expanded)
5. **The Effect of Strain Rate on the Hydrogen Embrittlement Susceptibility of Aluminum 7075**  
BALTACIOĞLU M. F., Cetin B., BAL B.  
Journal of Engineering Materials and Technology, vol.145, no.2, 2023 (SCI-Expanded)
6. **Finite Element Analysis of the Stress Distribution Associated With Different Implant Designs for Different Bone Densities**  
LEBLEBİCİOĞLU KURTULUŞ İ., KILIÇ K., BAL B., Kilavuz A.  
JOURNAL OF PROSTHODONTICS-IMPLANT ESTHETIC AND RECONSTRUCTIVE DENTISTRY, vol.31, no.7, pp.614-622, 2022 (SCI-Expanded)
7. **Investigations of strain rate, size, and crack length effects on the mechanical response of polycaprolactone electrospun membranes**  
Bayram F. C., KAPÇI M. F., Yuruk A., İŞOĞLU İ. A., BAL B.  
PROCEEDINGS OF THE INSTITUTION OF MECHANICAL ENGINEERS PART E-JOURNAL OF PROCESS MECHANICAL ENGINEERING, vol.235, no.6, pp.1957-1970, 2021 (SCI-Expanded)
8. **Experimental and Molecular Dynamics Simulation-Based Investigations on Hydrogen Embrittlement Behavior of Chromium Electroplated 4340 Steel**  
Dogan O., KAPÇI M. F., Esat V., BAL B.  
JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME, vol.143, no.4, 2021 (SCI-Expanded)
9. **Development of an optical measurement system for surface depth measurements and study of focus effect on determination of steel inclusion content by EN-10247**  
Durkaya G., KURTULDU H., Cetin B., BAL B.  
OPTICAL ENGINEERING, vol.60, no.10, 2021 (SCI-Expanded)
10. **The role of hydrogen in the edge dislocation mobility and grain boundary-dislocation interaction in  $\alpha$ -Fe**

KAPÇI M. F., Schoen J. C., BAL B.

INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, vol.46, no.64, pp.32695-32709, 2021 (SCI-Expanded)

11. **Assessment of biocompatibility of novel TiTaHf-based high entropy alloys for utility in orthopedic implants**  
Gurel S., Nazarahari A., Canadinc D., Cabuk H., Bal B.  
Materials Chemistry and Physics, vol.266, 2021 (SCI-Expanded)
12. **Effect of pre-rolling temperature on the interfacial properties and formability of steel-steel bilayer sheet in Single Point Incremental Forming**  
Hassan M., Hussain G., Ali A., Ilyas M., Malik S., Khan W. A., BAL B.  
PROCEEDINGS OF THE INSTITUTION OF MECHANICAL ENGINEERS PART B-JOURNAL OF ENGINEERING MANUFACTURE, vol.235, no.3, pp.406-416, 2021 (SCI-Expanded)
13. **Fracture behavior of novel biomedical Ti-based high entropy alloys under impact loading**  
Gurel S., Yagci M. B., Canadinc D., Gerstein G., Bal B., Maier H. J.  
MATERIALS SCIENCE AND ENGINEERING A-STRUCTURAL MATERIALS PROPERTIES MICROSTRUCTURE AND PROCESSING, vol.803, 2021 (SCI-Expanded)
14. **Corrosion behavior of novel Titanium-based high entropy alloys designed for medical implants**  
Gurel S., Yagci M. B., Bal B., Canadinc D.  
Materials Chemistry and Physics, vol.254, 2020 (SCI-Expanded)
15. **Lateral Angular Co-Extrusion: Geometrical and Mechanical Properties of Compound Profiles**  
Thuerer S. E., Peddinghaus J., Heimes N., Bayram F. C., BAL B., Uhe J., Behrens B., Maier H. J., Klose C.  
METALS, vol.10, no.9, 2020 (SCI-Expanded)
16. **A detailed investigation of the effect of hydrogen on the mechanical response and microstructure of Al 7075 alloy under medium strain rate impact loading**  
BAL B., Okdem B., Bayram F. C., AYDIN M.  
INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, vol.45, no.46, pp.25509-25522, 2020 (SCI-Expanded)
17. **Strain rate and hydrogen effects on crack growth from a notch in a Fe-high-Mn steel containing 1.1 wt% solute carbon**  
Najam H., Koyama M., BAL B., Akiyama E., Tsuzaki K.  
INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, vol.45, no.1, pp.1125-1139, 2020 (SCI-Expanded)
18. **The Precise Determination of the Johnson-Cook Material and Damage Model Parameters and Mechanical Properties of an Aluminum 7068-T651 Alloy**  
BAL B., Karaveli K. K., Cetin B., Gumus B.  
JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME, vol.141, no.4, 2019 (SCI-Expanded)
19. **Experimental investigation on chloroprene and acrylonitrile butadiene rubber types reinforced with nano-materials**  
Dogan O., Esat V., BAL B.  
MATERIALS RESEARCH EXPRESS, vol.6, no.8, 2019 (SCI-Expanded)
20. **On the detailed mechanical response investigation of PHBV/PCL and PHBV/PLGA electrospun mats**  
BAL B., Tugluca I. B., Koc N., İŞOĞLU İ. A.  
MATERIALS RESEARCH EXPRESS, vol.6, no.6, 2019 (SCI-Expanded)
21. **Lowering Strain Rate Simultaneously Enhances Carbon- and Hydrogen-Induced Mechanical Degradation in an Fe-33Mn-1.1C Steel**  
Tugluca I. B., Koyama M., Shimomura Y., BAL B., Canadinc D., Akiyama E., Tsuzaki K.  
METALLURGICAL AND MATERIALS TRANSACTIONS A-PHYSICAL METALLURGY AND MATERIALS SCIENCE, vol.50, no.3, pp.1137-1141, 2019 (SCI-Expanded)
22. **Microstructure and tribological properties of TiTaHfNbZr high entropy alloy coatings deposited on Ti-6Al-4V substrates**  
Tuten N., Canadinc D., Motallebzadeh A., BAL B.  
INTERMETALLICS, vol.105, pp.99-106, 2019 (SCI-Expanded)
23. **Microstructure and tribological properties of TiTaHfNbZr high entropy alloy coatings deposited on**

### **Ti6Al4V substrates**

Tüten N., CANADINC D., Motallebzadeh A., BAL B.

INTERMETALLICS, vol.105, pp.99-106, 2019 (SCI-Expanded)

24. **On the Utility of Crystal Plasticity Modeling to Uncover the Individual Roles of Microdeformation Mechanisms on the Work Hardening Response of Fe-23Mn-0.5C TWIP Steel in the Presence of Hydrogen**  
Bal B., Koyama M., Canadinc D., Gerstein G., Maier H. J., Tsuzaki K.  
JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME, vol.140, no.3, 2018 (SCI-Expanded)
25. **A Study of Different Microstructural Effects on the Strain Hardening Behavior of Hadfield Steel**  
BAL B.  
INTERNATIONAL JOURNAL OF STEEL STRUCTURES, vol.18, no.1, pp.13-23, 2018 (SCI-Expanded)
26. **High-concentration carbon assists plasticity-driven hydrogen embrittlement in a Fe-high Mn steel with a relatively high stacking fault energy**  
Tugluca I. B., Koyama M., BAL B., Canadinc D., Akiyama E., Tsuzaki K.  
MATERIALS SCIENCE AND ENGINEERING A-STRUCTURAL MATERIALS PROPERTIES MICROSTRUCTURE AND PROCESSING, vol.717, pp.78-84, 2018 (SCI-Expanded)
27. **Numerical Investigation of the Role of Volumetric Transformation Strain on the Relaxation Stress and the Corresponding Hydrogen Interstitial Concentration in Niobium Matrix**  
BAL B.  
ADVANCES IN MATERIALS SCIENCE AND ENGINEERING, 2017 (SCI-Expanded)
28. **A New Venue Toward Predicting the Role of Hydrogen Embrittlement on Metallic Materials**  
BAL B., Sahin İ., Uzun A., Canadinc D.  
METALLURGICAL AND MATERIALS TRANSACTIONS A-PHYSICAL METALLURGY AND MATERIALS SCIENCE, no.11, pp.5409-5422, 2016 (SCI-Expanded)
29. **Effect of strain rate on hydrogen embrittlement susceptibility of twinning-induced plasticity steel pre-charged with high-pressure hydrogen gas**  
Bal B., Koyama M., Gerstein G., Maier H. J., Tsuzaki K.  
INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, vol.41, no.34, pp.15362-15372, 2016 (SCI-Expanded)
30. **Incorporation of dynamic strain aging into a Visco-Plastic Self-Consistent model for predicting the negative strain rate sensitivity of Hadfield steel**  
BAL B., Gumus B., Canadinc D.  
JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME, vol.138, pp.1-8, 2016 (SCI-Expanded)
31. **Twinning activity in high-manganese austenitic steels under high velocity loading**  
Gumus B., Bal B., GERSTEIN G., Canadinc D., MAIER H. J.  
MATERIALS SCIENCE AND TECHNOLOGY, vol.32, no.5, pp.463-465, 2016 (SCI-Expanded)
32. **Twinning activities in high-Mn austenitic steels under high-velocity compressive loading**  
Gumus B., Bal B., GERSTEIN G., Canadinc D., MAIER H. J., GUNER F., ELMADAGLI M.  
MATERIALS SCIENCE AND ENGINEERING A-STRUCTURAL MATERIALS PROPERTIES MICROSTRUCTURE AND PROCESSING, vol.648, pp.104-112, 2015 (SCI-Expanded)
33. **Experimental and Numerical Evaluation of Thickness Reduction in Steel Plate Heat Exchangers**  
Onal O., Bal B., Canadinc D., Akdari E.  
JOURNAL OF ENGINEERING MATERIALS AND TECHNOLOGY-TRANSACTIONS OF THE ASME, vol.137, no.4, 2015 (SCI-Expanded)
34. **On the micro-deformation mechanisms active in high-manganese austenitic steels under impact loading**  
Bal B., Gumus B., GERSTEIN G., Canadinc D., MAIER H. J.  
MATERIALS SCIENCE AND ENGINEERING A-STRUCTURAL MATERIALS PROPERTIES MICROSTRUCTURE AND PROCESSING, vol.632, pp.29-34, 2015 (SCI-Expanded)
35. **Microstructure-based modeling of the impact response of a biomedical niobium-zirconium alloy**

### Articles Published in Other Journals

- 1. Investigation of Hydrogen Diffusion Profile of Different Metallic Materials for a Better Understanding of Hydrogen Embrittlement**  
KAPÇI M. F., BAL B.  
Gazi University Journal of Science, vol.36, no.4, pp.1775-1784, 2023 (ESCI)
- 2. Accurate Prediction of Residual Stresses in Machining of Inconel 718 Alloy through Crystal Plasticity Modelling**  
Kesriklioglu S., KAPÇI M. F., Buyukcapar R., CETIN B., Yilmaz O. D., Bal B.  
Afyon Kocatepe Üniversitesi Fen ve Mühendislik Bilimleri Dergisi, vol.23, no.1, pp.247-259, 2023 (Peer-Reviewed Journal)
- 3. DETERMINATION OF MATERIAL RESPONSE AND OPTIMIZATION OF JOHNSON-COOK DAMAGE PARAMETERS OF ALUMINIUM 7075 ALLOY**  
BAL B.  
Selçuk Üniversitesi Mühendislik, Bilim ve Teknoloji Dergisi, vol.6, no.2, pp.343-354, 2018 (Peer-Reviewed Journal)

### Books & Book Chapters

- 1. Potential Effects of Short-Range Order on Hydrogen Embrittlement of Stable Austenitic Steels—A Review**  
Bal B.  
in: Advances in Hydrogen Embrittlement Study, Prof. Dr. Vladimir A. Polyanskiy, Prof. Dr. Alexander K. Belyaev, Editor, Springer, London/Berlin, London, pp.1-18, 2021

### Refereed Congress / Symposium Publications in Proceedings

- 1. Data-driven discovery and DFT modeling of Fe<sub>4</sub>H on the atomistic level**  
Zagorac D., Zagorac J., Djukic M. B., Bal B., Schön J. C.  
5th International Conference on Structural Integrity, ICSI 2023, Funchal, Portugal, 29 August - 01 September 2023, vol.54, pp.446-452
- 2. Effect of Hydrogen on Impact Response of Ductile Cast Iron**  
Najam H., BAL B., Çetin B.  
International Energy and Engineering Conference 2019, 24 - 25 September 2019
- 3. Detailed Comparison of Hydrogen Concentration Modelling in Different Metal Matrices**  
BAL B., Ali S. F., Malik F.  
International Energy and Engineering Conference 2019, 24 - 25 September 2019
- 4. EFFECT OF HEAT TREATMENTS ON THE BOND STRENGTH OF COLD ROLL BONDED SN COATED STEELS**  
BAL B., Kapci M. F.  
ZEUGMA II. ULUSLARARASI MULTİDİSİPLİNER ÇALIŞMALAR KONGRESİ, 18 - 20 January 2019
- 5. Better Understanding of Hydrogen Embrittlement**  
BAL B., Tuğluca İ. B., Koyama M., Tsuzaki K.  
2018 STLE Tribology Frontiers Conference, 28 - 31 October 2018
- 6. The Mechanical Responses of Lightweight Aluminum Alloys and Their Applications**  
Karaveli K. K., BAL B.

3th International Conference on Material Science and Technology in Cappadocia (IMSTEC'18), 17 - 19 September 2018

7. **A COMPARATIVE STUDY ON HYDROGEN EMBRITTLEMENT MECHANISMS**

BAL B., Yerlitaş M., Çetin B., Meço H.

The 18th International Conference on Machine Design and Production, 3 - 06 July 2018

8. **COMPARING THE MECHANICAL RESPONSE OF AI 7075 AND AI7068**

Karaveli K. K., Gümüş B., BAL B.

The Internatinonal Conference on Materials Science, Mechanical and Automotive Engineerings and Technology, 10 - 12 April 2018

9. **MATERIAL SELECTION FOR KNEE EXOSKELETON FRAME**

Najam H., BAL B., ÜNAL R.

The Internatinonal Conference on Materials Science, Mechanical and Automotive Engineerings and Technology, 10 - 12 April 2018

10. **Effects of chemical composition and hydrogen charging on the mechanical response of slip-dominated high manganese austenitic steel**

Tuğluca İ. B., BAL B., Koyama M.

The Internatinonal Conference on Materials Science, Mechanical and Automotive Engineerings and Technology, 10 - 12 April 2018

11. **The Hydrogen Embrittlement Susceptibility of High Strength Steels**

BAL B., İŞOĞLU İ. A., Koyama M.

Advances in Functional Materials, 14 - 17 August 2017

12. **HYDROGEN EMBRITTLEMENT SUSCEPTIBILITY OF TWIP STEEL**

BAL B.

International Energy and Engineering Conference, 13 - 14 October 2016

13. **OPTIMISATION OF AUTOMOBILE INTERIOR DESIGN PARAMETERS TO MITIGATE THE EFFECTS OF FULL-FRONTAL AND OBLIQUE COLLISIONS**

Tarhan M., BAL B., ESAT V.

15. ULUSLARARASI MAKİNA TASARIM VE İMALAT KONGRESİ (UMTİK 2012), 19 - 22 June 2012

## Courses

Machine Elements , Undergraduate, 2015 - 2016

Materials Science, Undergraduate, 2015 - 2016

## Scientific Refereeing

Journal of Process Mechanical Engineering, SCI Journal, May 2016

Metallurgical and Materials Transactions A, SCI Journal, March 2016

Fatigue & Fracture of Engineering Materials & Structures, SCI Journal, November 2015

Journal of Mechanics Engineering and Automation, Other Indexed Journal, October 2015

## Metrics

Publication: 52

Citation (WoS): 117

Citation (Scopus): 115

H-Index (WoS): 6

H-Index (Scopus): 7

## Congress and Symposium Activities

Uluslararası Enerji ve Mühendislik Konferansı 2016, Invited Speaker, Gaziantep, Turkey, 2016

Centre for research on i-s interaction and mechanical property in steel, Invited Speaker, Fukuoka, Japan, 2016

International Conference on Processing and Manufacturing of Advanced Materials, Invited Speaker, Nevada, United States Of America, 2013

The 15th International Conference on Machine Design and Production, Invited Speaker, Denizli, Turkey, 2012

## Research Areas

Mechanical Engineering, Mechanical, Solid Mechanics, Fracture Mechanics, Finite Element Methods, Mechanical Testing, Continuous Mechanics, Metallurgical and Materials Engineering, Material science and engineering, Testing and Control of Materials, Mechanical Properties, Mechanical Metallurgy, Metallic Materials, Structure-Property Relationship, Engineering and Technology