Dr. Ihsan-ul-Haq Toor

Assistant Professor, Dept. of Mechanical Engineering
King Fahd University of Petroleum & Minerals
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Bio:

- Dr Ihsan-ul-haq Toor is assistant professor in the fields of materials electrochemistry in Department of Mechanical Engineering at KFUPM. He joined KFUPM in September 2010 as an assistant professor. Before joining KFUPM, Dr. Toor has worked as a senior research engineer (Materials and Corrosion) in Samsung Heavy Industries "Coating & Corrosion Research Center" Geoje-do, South Korea for three years. Dr. Toor received his B.S. degree from University of Engineering and Technology (UET), Lahore in 1999. Then he moved to Korea Advanced Institute of Science & Technology (KAIST) South Korea in 2001 to pursue his graduate studies on Korean government scholarship program. He received his Master's degree in 2003 and PhD in 2007 from Dept. of Material Science and Engineering, KAIST, majoring in "Corrosion & Electrochemistry". Dr. Toor is an active member of different societies such as; ECS, NACE, PEC, CSK and is a regular reviewer of different international journals. He has published and presented his work in different international journals and conferences. He is author/co-author of about 40 journal, conference papers and presentations.

  Dr. Toor has been mainly involved in the development of new economical and corrosion resistant materials for different industrial applications. His main focus has been stainless steels and Ni-base alloy. He has developed different alloys (by powder metallurgy and casting routes) and investigated the effect of different alloying elements on the corrosion resistance properties of these materials. Along with fundamental corrosion research, Dr. Toor focused on in-depth understanding of the corrosion resistance properties of these materials in terms of their passive film structure, composition and stability. Currently Dr. Toor is actively involved in various corrosion related research and development activities. Some of his research areas are; Erosion-Corrosion, Electrodeposition, Material challenges for renewable energy and desalination, Corrosion modelling and protection strategies.

EDUCATION:

PhD **Korea Advanced Institute of Science & Technology (KAIST), South Korea**
Dept. of Materials Science & Engineering (Feb. 2008)
Advisor: Prof. Hyuk Sang Kwon
Director, Corrosion & Energy Storage Materials Lab., Dept. of Materials Science & Engineering, KAIST
Research Topics: Effect of alloying elements (Mn, Si, Cu) on the passivity and repassivation kinetics of stainless steel alloys

MS **King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia**
Mechanical Engineering (December 1999)
Advisor: Prof. Zin-Hyoung Lee
Director, Advanced Material Processing Lab, Dept. of Materials Science & Engineering, KAIST
Research Topics: Computer aided cooling curve analysis of aluminum alloys

BS **University of Engineering and Technology, Lahore, Pakistan**
Metallurgical Engineering (August 1999)
Advisor: Dr. Saleem Shujah
Research Topics: Problems in the production of case hardened alloy steel

SPECIALIZATION:

Metallurgy& Material Science / Electrochemistry

PROFESSIONAL EXPERIENCE:

Assistant Professor Sep 2010 – present
Department of Mechanical Engineering
King Fahd University of Petroleum and Minerals,
Dhahran, Saudi Arabia

Senior Research Engineer (Materials & Corrosion) Jan 2008 – Aug 2010
Coating and Corrosion Research Center
Samsung Heavy Industries (SHI), Geoje-do, South Korea

Quality Control Engineer Jan– Aug 2000
Pak Precise Engineering (Pvt) Ltd., Multan Road, Lahore, Pakistan

Internee Sep – Dec 2000
Pakistan Council of Scientific & Industrial research (PCSIR), Lahore, Pakistan

RESEARCH AREAS/INTERESTS:

- Corrosion and Corrosion Control, Erosion Corrosion, Electrodeposition
- Metallurgy of steel and stainless steels/ Alloy development
- Environmental induced cracking and Mechanical Behavior of Materials
- Material characterization and surface engineering for corrosion
- Materials for Renewable energy (Batteries/Fuel cell/Hydrogen/Solar energy)

RESEARCH PROJECTS:

Project Title & Team	Funding Agency	Duration	Status	Role
Electrochemical investigations on the role of Si in ferritic stainless steel alloys (IH Toor, N-Aqeeli, M.M.Baig, F. Patel)	KFUPM (IN111048)	9/2012-12/2014	In-progress	PI
Development of austenitic stainless steels with PM routes and their Electrochemical investigations (IH Toor, N-Aqeeli, M.M.Baig, F. Patel)	KFUPM (IN121033)	3/2013-5/2015	In-progress	PI
Experimental and computational investigation of erosion-corrosion in piping systems	NSTIP (11-ADV1619-04)	3/2012-5/2014	In-progress	Co-I

Previous projects:

Project Title & Team	Funding Agency	Duration	Status	Role
Computer aided cooling curve analysis of Aluminum alloys	KAIST	2001~2003	Completed	MS
Development of high Mn duplex stainless steels	KAIST-POSCO	2003~2006	Completed	PhD

Role of alloying elements on the SCC susceptibility of Austenitic stainless steels	KAIST-POSCO	2003~2007	Completed	PhD
Optimizing different weld methods (SAW, FCAW) and weld positions to overcome the sensitization problem in specially designed 304 stainless steel alloy	SHI	2008~2009	Completed	CO-I
Optimizing the flame straightening and cold working conditions to overcome sensitization problem in 304 stainless steel alloy	SHI	2008~2009	Completed	CO-I
Optimizing the suitable combination of surface treatment methods for improved corrosion resistance of stainless steels as well as high work efficiency during block fabrication	SHI	2009~2010	Completed	CO-I
Feasibility of using IR heating for coating curing at block stage and designing suitable IR heating set-up"	SHI	2008~2010	Completed	CO-I
Development of Corrosion Database for Shipbuilding and Offshore Structures	SHI	2008~2010	Completed	PI

RESEARCH SUPERVISION:

1. Jahanzaib Malik, "Study on the Solid Particle Erosion and Erosion-Corrosion Behavior of Aluminum and Steels", **MS Thesis Advisor (graduating in May 2014)**

2. Nauman Zafar, "H_2S and CO_2 Corrosion of SA-543 and X65 Steels in Oil/Water Emulsion", **MS Thesis Committee Member (graduating in May 2014)**

3. Junaid Ahmad, "Investigating the role of Si in austenitic stainless steels prepared by powder metallurgy", **MS, Thesis Advisor, in progress.**

4. Nabeel Ahmad, "Investigating the Electrochemical properties of Ferritic Stainless Steels", **MS, Thesis Advisor, in progress (part time student).**

5. Abdullah Ahmary " Environmental Friendly Inhibitors for CO2 Corrosion", **MS Thesis Committee Member, in progress.**

Teaching:

COURSES TAUGHT:

- ME 216: Materials Science & Engineering (Lec.)
- ME 217: Materials Science & Engineering (Lab.)
- ME 205: Materials Science (Lec.)
- ME 472: Corrosion Engineering1 (Lec.)
- ME 575: Advanced Corrosion Engineering-**Graduate Course** (Lec.)
- MSE 502: Thermodynamics of Materials-**Graduate Core Course** (Teaching now in 132)

SHORT COURSES OFFERED:

- COE108=>Protective coatings for oil and gas industry
- COE212=>Corrosion Inspection and Monitoring in oil and gas industry

♦ TECHNICAL SEMINARS:

- Coatings for corrosion protection (types, application requirements, surface preparation, testing) for different industrial applications
- Stainless steels and Ni base alloys for the industry with special focus on petrochemical and marine industry
- Fundamentals of Corrosion, its Prevention and Control
- Electrochemical Techniques for Corrosion Measurement
- Phenomenon of Stress Corrosion Cracking in Stainless Steels and its Prediction Based on repassivation Kinetics
- Fundamentals of Cathodic Protection Design
- Corrosion and Renewable Energy Research

- Fundamentals of Batteries, Anode and Cathode Materials and Future Research Trends
- Fuel cells and Hydrogen Energy for the future
- Creativity tools in Research and Development Activities
- Role of 6 Sigma in product development

ADVISOING:

Senior Design Project

1. Ahmad Al-Turki, Abdullah Al-Shahrani, Hamzah Abdullah and Meshari Al-Harbi, "Developing a cathodic protection measurement system to protect the buried pipelines", **in progress**.

2. Tareq Alkadhmi, Mohamed Obad, Husam Basfer, Abdallh Aldomini, Ahamad Alaryani, "Designing an automated scratch electrode set-up for in-situ measurement of repassivation kinetics of metallic alloys and coatings", **in progress**.

Coop Students

1. Ibrahim Botwaibah, (ID#200856460), Saudi Aramco, **in progress**
2. Hussain Ali Al-sadiq (ID#200986510), Al-Marhoon Company, **in progress**
3. Khalid Hassan AlZahrani (ID # 200883180), Saudi Aramco Company-Ras Tanura Refinery (RTR), 2013, **completed**
4. Hassan Abdulmunem Alaithan (ID#200858760), Saudi Aramco, 2013, **completed**
5. Fahad A. Al-Zahrani (ID #: 200860320), SABIC, National Methanol Company (Ibn Sina), 2012-2013, **completed**
6. Mohammad Al-Hajri, (ID# 200776910), Saudi Aramco Company, 2011-2012, **completed**
7. Ali Muslem Al-Muslem (ID#200769410), Saudi Arabian Oil Company, 2011-2012, **completed**

Summer Training

I have evaluated two summer training reports per/year since 2011

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JOURNAL PUBLICATIONS:

[1]. **IH Toor**, M. Ejaz and HS Kwon, "Mott-Schottky analysis of passive films on Cu containing Fe-20Cr-xCu (x=0, 4) alloys", Corrosion engineering science and technology,(2014), pp. 1-6,
DOI: http://dx.doi.org/10.1179/1743278214Y.0000000154

[2]. **IH Toor,** "Evaluation of Corrosion Performance of Two High Mn Stainless Steel Alloys", Int. J. Mater. Res. (formerly Z. Metallkd.), 105 (2014),pp. 1–6, DOI 10.3139/146.111035

[3]. B. S. Yilbas, **IH Toor** and J. Malik, "Corrosion Resistance of Laser Treated Titanium Alloy with Presence of B_4c Particles at Surface", International Journal of Materials Research, **Accepted, 30 April 2014**

[4]. **IH Toor,** "Repassivation kinetics and its role in SCC prediction-A Review", Int. J. Electrochem. Sci., 9(2014), pp. 2737-2755

[5]. J. Malik, **I.H. Toor**, W.H. Ahmed, Z.M. Gasem, M.A. Habib, R. Ben-Mansour and H.M. Badr, Evaluating the Effect of Hardness on Erosion Characteristics of Aluminum and Steels, Journal of Materials Engineering and Performance (Published online on 22 April 2014), DOI: 10.1007/s11665-014-1004-x

[6]. B. S. Yilbas, **I. H. Toor**, J. Malik and F. Patel, " Laser gas assisted treatment of AISI H12 tool steel and corrosion properties", Optics and Lasers in Engineering, Vol. 54, (2014), pp. 8-13.

[7]. B. S. Yilbas, **I. H. Toor,** Patel F., Al-Shehri Y., and Baig M.A., "HVOF diamalloy 2002 coating of steel surface: residual stress analysis and electrochemical testing of surfaces", Industrial Lubrication and Tribology, (2013), in press.

[8]. **I.H. Toor,** B. S. Yilbas, C. Karatas, M.A.Hussein and M.N.Zafar, Electrochemical investigations on the effect of different laser surface treatments on hastelloy G alloy International Journal of Materials Research: Vol. 104, No. 10, pp. 1007-1012.

[9]. B. S. Yilbas, **I. H. Toor,** Jahanzaib malik, F. Patel and C. Karatas, "Electrochemical Testing of Laser Treated Bronze Surface", Journal of alloys and compounds, 563 (2013) 180-185.

[10]. Kkoch Nim, **I.H.Toor,** Ahn soohoon and H.S.Kwon, "Effects of Cu on the passive film stability of Fe–20Cr–xCu (x = 0, 2, 4 wt.%) alloys in H2SO4 solution", Electrochimica Acta 88 (2013) 170–176.

[11]. B. S. Yilbas, **I. H. Toor,** F. Patel and M.M.A. Baig, "Laser Re-melting of HVOF Coating: Electrochemical testing of Surfaces", Journal of Materials Engineering and Performance, 22 (5), (2013), pp 1505-1511.

[12]. Kkoch Nim, **I.H.Toor**, Ahn soohoon and H.S.Kwon, "Influence of Cu on the Passivation Behavior of Fe-20Cr-xCu (x=0, 2, 4 wt.%) Alloys in Sulfuric Acid", CORROSION, Vol. 69, No. 6 (2013), pp. 560-567.

[13]. B. S. Yilbas, **I. H. Toor**, C. Karatas, F. Patel and M.M.A. Baig, "Laser treatment of A286 superalloy: corrosion resistance of the treated surface", Surface and Interface Analysis, Vol. 44 (2012), pp. 1364-1369.

[14]. **I.H.Toor**, M.Ejaz and H.S.Kwon, "Effect of TiO2 on the Repassivation kinetics of Alloy 600 in Caustic Solutions", CORROSION, 69, (2013), pp. 590-567.

[15]. N-Aqeeli and **IH Toor**, "Comparison of corrosion behavior of electrochemically deposited Nano Cobalt Coated Ni sheet, Journal of Chemistry, 2013

[16]. **I.H.Toor**, "Effect Mott-Schottky Analysis of passive films on Si containing stainless steel alloys", Journal of The Electrochemical Society, Volume 158, Number 11, (2011), C391-395

[17]. Juntae Yun, **Ihsan-ul-haq Toor**, and Minyoung shon, " Effect of different surface treatment methods on the corrosion behavior of 304 stainless steel alloy", Corrosion Science and Technology, Vol. 8, No. 6, Dec. 2009

[18]. **IH Toor**, and Hyuk Sang Kwon "Effects of Si on the Repassivation Kinetics and SCC Susceptibility of Stainless Steels", J. Electrochem. Soc. 155 (2008), pp. C495-C500

[19]. **IH Toor**,, Kyung Jin Park and Hyuk Sang Kwon "Manganese Effects on Repassivation Kinetics and SCC Susceptibility of High Mn–N Austenitic Stainless Steel Alloys", J. Electrochem. Soc. 154 (2007), pp. C494-C499

[20]. **IH Toor**,, Park Jung Hyun and Hyuk Sang Kwon "Development of High Mn-N Duplex Stainless Steel for Automobile Structural Components", Corrosion Science 50 (2008), pp. 404-410

[21]. **IH Toor,** Jae-Sik Shin and Zin-Hyoung Lee, "Computer Aided Cooling Curve Analysis of Aluminum Alloy A356", METALS AND MATERIALS International, Vol. 10 (2004), pp. 89-96

CONFERENCE PUBLICATIONS:

[1]. **IH Toor** "Effect of Copper Solute Concentration on the Corrosion Behavior of Fe-20Cr-xCu Alloys" 15th Middle East Corrosion Conference & Exhibition, **Paper No. 14210 (** 2014), pp. 1-10

[2]. **IH Toor** and Zuhair M. Gasem, "Considering alternatives for Ni in stainless steel alloy design and development for competitive corrosion properties", EUROCORR, (2012), pp. 1-10

[3]. **IH Toor** and Zuhair M. Gasem, "Problem of stress corrosion cracking and its prediction based on repassivation kinetics", 14th Middle East Corrosion Conference, **Paper No. 134-CR-19**, (2012), pp. 1-17

[4]. **IH Toor** and Hyuk Sang Kwon "Stress corrosion cracking behavior of SS304Si for hot water storage tank applications based on repassivation **kinetics"** 5th International Bhurban Conference on Applied Sciences and Technology (IBCAST), (2007), pp. 1-6

CONFERENCE PRESENTATIONS/POSTERS:

[1]. J. Malik, I.H. Toor, W.H. Ahmed, Z.M. Gasem, M.A. Habib, R. Ben-Mansour and H.M. Badr, "Corrosion-Enhanced Erosion of Carbon Steel AISI 1020 and StainlessSteel AISI 316", NACE CORROSION, March 9~13, Texas, U.S.A.

[2]. **Ihsan-ul-haq Toor** "Investigating the Effect of Copper on the Corrosion Behavior of Fe-20Cr-xCu", 15th Middle East Corrosion Conference, 2~5 February, 2013, Kingdom of Bahrain

[3]. Jahanzaib Malik, M. Abdul Azeem and Ihsan ul haq Toor, "EFFECT OF ANNEALING TEMPERATURE ON CORROSION BEHAVIOR OF TWO STAINLESS STEEL ALLOYS" 15th Middle East Corrosion Conference, 2~5 February, 2013, Kingdom of Bahrain **(won the best poster award)**

[5]. **Ihsan-ul-haq Toor** and Zuhair M. Gasem, "Considering alternatives for Ni in stainless steel alloy design and development for competitive corrosion properties", EUROCORR Sep. 2012, Istanbul, Turkey

[6]. **Ihsan-ul-haq Toor** and Zuhair M. Gasem, "Problem of stress corrosion cracking and its prediction based on repassivation kinetics", 14th Middle East Corrosion Conference, 12~15 February, 2012, Kingdom of Bahrain

[7]. **Ihsan-ul-haq Toor,** and Hyuk Sang Kwon "Study on the effects of Copper on the passivity of Fe-20Cr-xCu stainless steel alloys", presented in ICEC 2007 , May 20~24,Soul, Korea

[8]. **Ihsan-ul-haq Toor** and Hyuk Sang Kwon "Stress corrosion cracking behaviour of SS304Si for hot water storage tank applications based on repassivation kinetics**"** 5th International Bhurban Conference on Applied Sciences and Technology (IBCAST), 8th ~11th January 2007**,** Islamabad, Pakistan

[9]. **Ihsan-ul-haq Toor** and kwon-Hyuk Sang, "Establishment of SCC criteria for hot water storage tank applications", Korean Corrosion Society Conference, May 11-12, 2006, Seoul, South Korea

[10]. **Ihsan-ul-haq Toor** and kwon-Hyuk Sang, "Effect of Mn on the repassivation kinetics and SCC susceptibility of the high Mn-N stainless steel alloys" Korean Corrosion Society Conference, Nov. 24~25, 2005, Jochiwon, South Korea

[11]. **Ihsan-ul-haq Toor** and kwon-Hyuk Sang, "Investigation of SCC susceptibility of 200-series stainless steel alloys by SSRT" International Electrochemical Society Conference, Sep 25~30, 2005, Busan, South Korea

[12]. **Ihsan-ul-haq Toor** and kwon-Hyuk Sang, "Stress corrosion cracking susceptibility of 200-series stainless steel alloys" Korean Corrosion Society Conference, May 27, 2005, Suwon, South Korea

[13]. **Ihsan-ul-haq Toor** and Zin-Hyoung Lee, "Computer Aided Cooling Curve Analysis of Aluminum Alloy A356", METALS AND MATERIALS CONFERENCE", June 2003, South Korea

TECHNICAL REPORTS:

r1. **IH Toor, N-Aqeeli, F. Patel and M.Baig, "**Electrochemical investigations on the corrosion behavior of Si containing stainless steel Alloys", Submitted two project progress report for project#IN111048 **(in progress)**

r2. **IH Toor, N-Aqeeli, F. Patel and M.Baig, "**Development of Austenitic stainless steel alloy with Si addition for improved corrosion resistance properties", Submitted 1st project progress report for project#IN121033 **(in progress)**

r3. **IH Toor and HS Kwon, "**Establishment of SCC criteria of stainless steel for water heating system", Final Report submitted to POSCO steel, South Korea, 2007(**completed)**

r4. **IH Toor and HS Kwon, "**Exploring the development of high Mn-N duplex stainless steels", Final Report submitted to POSCO steel, South Korea, 2006 **(completed)**

r5. **IH Toor and HS Kwon, "**Evaluation of stress corrosion cracking of 200 series stainless steels", Final Report submitted to POSCO steel, South Korea, 2005(**completed)**

r6. Prepared and submitted up to 30 technical reports on different technical issues/ projects carried out during my stay in Samsung heavy Industries (SHI), both internally and externally for SHI customers.

HONORS/AWARDS Received:

15th MECC Best Poster Award Middle East Corrosion Conference, Feb. 2~5, Kingdom of Bahrain, 2014	Feb. 2014
SHI's Core Talent Award (Coating & Corrosion Research Center), for consecutive two years	2008-2009 2009-2010
Korea Science & Engineering foundation (KOSEF) **PhD scholarship**	2003-2007
Korea Advanced Institute of Science & Technology **(KAIST), MS scholarship**	2001-2003
Departmental Standing Committees	

PROFESSIONAL INVOLVEMENT:

Conference Attendance

- 15th Middle East Corrosion Conference, 2~5 February, 2013, Kingdom of Bahrain
- European Corrosion Congress (EUROCORR) Sep. 2012, Istanbul, Turkey
- 14th Middle East Corrosion Conference, 12~15 February, 2012, Kingdom of Bahrain
- International Corrosion Engineering Conference (ICEC) 2007 , May 20~24,Soul, Korea .
- 5th International Bhurban Conference on Applied Sciences and Technology (IBCAST), 8th ~11th January 2007, Islamabad, Pakistan
- Korean Corrosion Society Conference, May 11-12, 2006, Seoul, South Korea
- Korean Corrosion Society Conference, Nov. 24~25, 2005, Jochiwon, South Korea
- International Electrochemical Society Conference, Sep 25~30, 2005, Busan, South Korea
- Korean Corrosion Society Conference, May 27, 2005, Suwon, South Korea .
- METALS AND MATERIALS CONFERENCE", June 2003, South Korea

Technical Reviewer

Corrosion Science
Journal of Alloys and Compounds
Journal of Industrial and Engineering Chemistry

Technical Involvement

NACE Technical Coordination Committee (TCC), Member
Involved in "Deepwater Corrosion Operations" and "High Strength Steel Corrosion"TCCs.
Working together with other colleagues to identity the challenges in these areas and identifying the milestones of future.
Lab Director

Professional Training Workshops

5TH Workshop on Clean Water and Clean Energy Jan 2011
Center for Clean Water and Clean Energy at MIT and KFUPM

SABIC Materials Day Workshop April, 2013

ME Dept. KFUPM

Deanship of Academic Development Seminars/workshops Sep. 2010

"Academic Portfolio: A New and Different Approach to Documenting Teaching Research and Service

"Introduction to co-operative learning and foundations of design of high performance learning environments" August 2013

"Teaching engineering design"

"Teaching engineering using community engagement to teach engineering"

"Technical Education in Knowledge Era"

PROFESSIONAL MEMBERSHIPS:

National Association of Corrosion Engineers (NACE) Aug 2011– present
(Membership No. 314800)
Electrochemical Society (ECS) May 2001 – present
(Membership No. 350799)

Dept./Univ. committees:

Graduate/Doctoral Committee, Member (2010-2011, 2012-2014)
Promoting & Industrial Relations Committee, Member (Sep. 2011-2012)
Faculty Search Committee (June 2012-Aug 2012)

Member, Executive Committee (2012-2013)
Center of Research Excellence in Corrosion (Core-C)
Participated in planning and development activities of the Corrosion center.

Departmental Adhoc Committees/Other Assignments

Committee on QIYAS (2012-2013)
(National Center for Assessment and Evaluation)

NEWS:

1: Book Chapter Contribution

Book Name:
Metal Chalcogenide Semiconductor Nanostructures and Their Applications in Renewable Energy
Book ISBN: 9781118237915
Tentative Publication Date/Publisher: May-June 2014/ Wiley-Scrivener
Chapter Contribution: Ihsan-ul-Haq Toor and Shafique Khan, "Structural defects and optical properties of metal chalcogenide semiconductor nanostructures

2: Dr. Toor with his student "Jahanzaib Malik "won the "Best Poster Award" in 15th Middle East Corrosion Conference, . The poster title was ""Effect of annealing temperature on corrosion behavior of two different stainless alloys""

3: My 1st MS student "Jahanzaib Malik" successfully defended his MS thesis, titled "Study on the Solid Particle Erosion and Erosion-Corrosion Behavior of Aluminum and Steels"