PROFILE

Dr. ***Shahrokh Ahangarani*** was born on April 11, 1966 in Tehran. He completed his bachelor's degree at Isfahan University of Technology in the field of materials engineering and then completed his master's and doctoral studies in field of corrosion and protection of materials at Tarbiat Modares University in Tehran. In 2006, he was employed as a full-time researcher at the Iranian research Organization for science and technology (IROST). Currently, he has conducted several research projects in the fields of surface technology and coating of materials, and several doctoral and postgraduate students have graduated under his guidance. Has experienced various executive experiences such as director general of reference laboratories and deputy director of support and human resources in this workplace.

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AFFILIATION

IROST
Iranian Research and Organization for Science and Technology
Department of Advanced Materials and Renewable Energy
group: corrosion and surface engineering
Tehran, Iran

EDUCATION

PhD in Materials Engineering
Corrosion and protection of materials
Coating of materials and thin films
Surface technology
Implant biomaterials
Hydrophobic coating technology

WORK EXPERIENCE

1- Faculty member of the Advanced Materials and Renewable Energy department.
2- Director of Corrosion and Surface Engineering Department
3- General manager of the organization's reference laboratories
4- Deputy of Support and Human Resources of the Organization
5 - Member of the Scientific Council of Materials Research Institute
6 - Member of the specialized group of materials and metallurgy in the Khwarizmi International festival.
7- Member of the publishing council of the organization
8- Member of the Inventory Evaluation Council
9- Member of the board of the Iranian Corrosion Association

RESEARCH PROJECTS

1- Production of zinc-nickel coatings, IROST.
2- Investigating the causes of corrosion of LPG capsules of gas-burning vehicles, IROST.
3- Investigating the causes of hot destruction and corrosion of gas turbine blades, Power Research Institute.
4- Investigation and analysis of locomotive crankshaft failure, Railway Research Center.
5 - Design and construction of plasma nitrogen delivery system, IROST.
6- Improving the surface properties of industrial steels by using a new method of using active screen Plasma nitriding, IROST.
7- Creating anti-refraction coating on the glass housing of absorber receivers in thermal power plants Solar, IROST.
8- The process of creating nanostructured thin films by modern PACVD method, IROST.

9 - Investigation of titanium nitride base coatings with engineering properties required for use in Implantable parts in the body, IROST.
10 - Synthesis and characterization of coatings used in replacement parts in the body with properties High engineering through plasma assisted chemical vaper deposition (PACVD), IROST.

PUBLICATION

1- **Sh. Ahangarani**, F. Mahboubi, A.R. Sabour, Effects of various nitriding parameters on active screen plasma nitriding behavior of a low-alloy steel, Vacuum 80 (2006) 1032–1037

2- **Sh. Ahangarani**, A.R. Sabour, F. Mahboubi, Influence of the active screen setup and process parameters on the behavior of plasma nitrided 30CrNiMo8 steel, Applied Surface Science 254 (2007) 1427–1435

3- M. Aliofkhazraei, **Sh. Ahangarani**, and A. Sabour Rouhaghdam, Study of Pulse on Pulsed Nanocrystalline Plasma Electrolytic Carbonitriding on Nanostructure of Compound Layer, Surface Review and Letters, Vol. 15, 2008

4- **Sh. Ahangarani**, A.R. Sabour, F. Mahboubi, T. Shahrabi, The influence of active screen plasma nitriding parameters on corrosion behavior of a lowalloy steel, Journal of Alloys and Compounds 484 (2009) 222–229

5- M. Aliofkhazraei, **Sh. Ahangarani**, and A. Sabour Rouhaghdam Effect of surface nanocrystallization and PPEC time on complex nanocrystalline hard layer fabricated by plasma electrolysis, Transactions of Nonferrous Metals Society of China, Volume 20, Issue 3, March 2010, Pages 425-431

6- Aliofkhazraei, **Sh. Ahangarani**, and A. Sabour Rouhaghdam, Effect of the duty cycle of pulsed current on nanocomposite layers formed by pulsed electrodeposition, RARE METALS, Vol. 29, No. 2, April 2010, Pages 209

7- M. Raoufi, Sh. Mirdamadi, F. Mahboubi, **Sh. Ahangarani**, M.S. Mahdipoor, H. Elmkhah, Correlation between the surface characteristics and the duty cycle for the PACVD derived TiN nanostructured films, Surface and Coatings Technology, Volume 205, Issues 21-22, 25 August 2011, Pages 4980-4984

8- M. Aliofkhazraei, Mohammad Yousefi, **Sh. Ahangarani**, A. Sabour Rouhaghdam, Synthesis and properties of ceramic-based nanocomposite layer of aluminum carbide embedded with oriented carbon nanotubes, Ceramics International, Volume 37, Issue 7, September 2011, Pages 2151- 2157

9- M.S. Mahdipoor, F. Mahboubi, **Sh. Ahangarani**, M. Raoufi, and H. Elmkhah, the influence of plasma nitriding pre-treatment on the tribological properties of TiN coatings deposited by PACVD, Journal of Materials Engineering and Performance, 25 April 2011

10- M. Raoufi, Sh. Mirdamadi, F. Mahboubi, **Sh. Ahangarani**, M.S.Mahdipoor, H. Elmkhah Tribological study of TiN nano structured films deposited on plasma nitrided H11 steel by pulsed DC PACVD, Advanced Materials Research 264-265 , pp. 1395-1400, 2011

11- Ali Shanaghi, **Shahrokh Ahangarani**, Ali Reza Sabour Rouhaghdam, Paul K. Chu, Improved tribological properties of TiC with porous nanostructured TiO2 intermediate layer, Materials Chemistry and Physics 131 (1-2), pp. 420-424, 2011

12-Ali Shanaghi, Ali Reza Sabour Rouhaghdam, **Shahrokh Ahangarani**, Paul K. Chu, Effects of duty cycle on microstructure and corrosion behavior of TiC coatings prepared by DC pulsed plasma CVD, Applied Surface Science 258 (7), pp. 3051-3057, 2012

13-Ali Shanaghi, Ali Reza Sabour Rouhaghdam, **Shahrokh Ahangarani**, Effect of duty cycle on residual stress and tribology behavior of TiC x nanostructure coating deposited by PACVD method, Surface Engineering 28 (5), pp. 364-370, 2012

14-M. Raoufi, Sh. Mirdamadi, F. Mahboubi, **Sh. Ahangarani**, M.S. Mahdipoor, H. Elmkhah,The influence of plasma nitriding pre-treatment on tribological properties of TiN coatings deposited by PACVD , Journal of Materials Engineering and Performance 21 pp. 958-964 , 2012

15-M. Raoufi, Sh. Mirdamadi, F. Mahboubi, **Sh. Ahangarani**, M.S. Mahdipoor, H. Elmkhah, Effect of active screen plasma nitriding pretreatment on wear behavior of TiN coating deposited by PACVD technique, Applied Surface Science 258 (20), pp. 7820-7825, 2012

16- Ali Shanaghi, Ali Reza Sabour Rouhaghdam, **Shahrokh Ahangarani**, Paul K. Chu, Effect of plasma CVD operating temperature on nanomechanical properties of TiC nanostructured coating investigated by atomic force microscopy, Materials Research Bulletin 47 (9) , pp. 2200-2205 , 2012

17-Hasan Elmkhah, Farzad Mahboubi, Amir Abdollah-Zadeh, **Shahrokh Ahangarani**, Mahdi Raoufi, Mohammad Sadegh Mahdipoor, Size dependency of corrosion behavior for TiN nanostructure coatings deposited by the PACVD method, Materials Letters 82, pp. 105-108, 2012

18-Mahdipoor M.S., Montazeri M., Soltanieh M., Mahboubi F., **Ahangarani Sh.**, Habibi M.H., Effect of duty cycle on microstructural, mechanical and tribological properties of TiN layer deposited by PACVD, TMS Annual Meeting 1, pp. 107-116, 2011

19-M. Azadi, A. Sabour Rouhaghdam, **S. Ahangarani**, Mechanical behavior of TiC coating by PACVD, IJE TRANSACTIONS C: spects Vol. 27, No. 6 (June 2014) 923-930

20-Haman Hedaiatmofidi, Alireza Sabour Rouh Aghdam, **Shahrokh Ahangarani**, The effect of chlorine content on properties of TiN deposited with PECVD method, Materials Sciences and Applications, 2013, accepted.

21-M. Azadi, A. Sabour Rouhaghdam, **S. Ahangarani**, Properties of TiC Coating by Pulsed DC PACVD, Journal of Coatings, 2013, p 1-6.

22-M. Azadi, A. Sabour Rouhaghdam, **S. Ahangarani**, Mechanical behavior of TiN/TiC multilayer coatings fabricated by plasma assisted chemical vapor deposition on AISI H13 hot work tool steel, Surface and Coatings, Technology, vol 245, p 156-166, 2014

23-M. Azadi, A. Sabour Rouhaghdam, **S. Ahangarani**, H. H. Mofidi, Mechanical behavior and properties of TiN/TiC coating using PACVD, Advanced Materials Research, vol 829, p 476-481, 2014.

24-Haman Hedaiatmofidi, Alireza Sabour Rouh Aghdam, **Shahrokh Ahangarani**, Mansour Bozorg, Mahboube Azadi Fracture toughness of TiN coating as a function of interlayer thickness, Advanced Materials Research, vol 829, p 466-470, 2014

25-Najme lari, **Shahrokh Ahangarani**, Ali Shanaghi, Effect of catalyst type on structural, morphological, and optical properties of SiO_2 thin film applied by sol- gel method, Advanced Materials Research, vol 829, p 446-450, 2014

26-Haman Hedaiatmofid, Alireza Sabour RouhAghdam, **Shahrokh Ahangarani**, Mansour Bozorg, Mahboube Azadi, Maryam Valiei, Deposition of Titanium Layer on Steel Substrate Using PECVD Method: A Parametric Study, Materials Sciences and Applications, 2014, 5, 140-148

27-Mahboobeh Azadi, Alireza Sabour, **Shahrokh Ahangarani**, Haman Hedaiat Mofidi, Mechanical behavior of TiN/TiC multilayer coatings fabricated by plasma assisted chemical vapor deposition on AISI H13 hot work tool steel, Surface & Coatings Technology, 245 (2014) 156–166

28-M. Azadi, A. Sabour Rouhaghdam, **S. Ahangarani**, Effect of Temperature and Gas Flux on the Mechanical Behavior of TiC Coating by Pulsed DC Plasma Enhanced Chemical Vapor Deposition, International Journal of Engineering, August 2014, 1243-1250.

29-Najme lari, **Shahrokh Ahangarani**, Ali Shanaghi, Preparation of nanostructure silica antireflective coatings by using sol–gel method, Optik International Journal for Light and Electron Optics, Optik 126 (2015) 5363–5367.

30-Najme lari, **Shahrokh Ahangarani**, Ali Shanaghi, Effect of Different TiO2- SiO2 Multilayer Coatings Applied by Sol-Gel Method on Antireflective Property, Journal of Materials Engineering and Performance, 2015.

31-Najme lari, **Shahrokh Ahangarani**, Ali Shanaghi, Six-layer antireflection TiO2/SiO2 coatings for solar covers: role of Triton and PDMS additives, Journal of Materials Science: Materials in Electronics, 2016, 27(7) P 7141-7149.

32-Najme lari, **Shahrokh Ahangarani**, Ali Shanaghi, A Novel Route to Prepare Hydrophobic and Durable Antireflective Hybrid Silica Coating by Sol-Gel Method, Protection of Metals and Physical Chemistry of Surfaces, 2016, 52(3), P 475-480.

33-**Shahrokh Ahangarani**, Najme lari, Ali Shanaghi, Stable multilayer TiO2– SiO2 coatings for antireflection applications, Glass Physics and Chemistry, 2016, 42(1), P 70-77.

34-**Shahrokh Ahangarani**, Najme lari, Ali Shanaghi, Influence of TEOS concentration and Triton additive on the nanostructure silica sol-gel anti-reflective coatings, Int. J. Materials and Product Technology, 2017, 55(4), 1-123.

35- Azadi, M, Rouhaghdam, A Sabour, **Ahangarani S**, A Review on Titanium Nitride and Titanium Carbide Single and Multilayer Coatings Deposited by Plasma Assisted Chemical Vapor Deposition, International Journal of Engineering, 2016, 29(5), 677-687.

36-Meysam Zarchi, **Shahrokh Ahangarani**, Study of silicon films deposited by EB-PVD and the effect of applying annealing conditions on them, Optik International Journal for Light and Electron Optics, 154 (2018) 601–609.

37-Shahram Abbasi, Mohammad Esmailian, **Shahrokh Ahangarani**, Investigation of the Microstructure, Micro-Texture and Mechanical Properties of a HSLA Steel, Hot-Rolled and Quenched at Different Cooling Rates, Metallography, Microstructure, and Analysis, 2018, 7, 596–607.

38-Peyqambarian, Mina, Azadi, Mahboobeh, **Ahangarani Shahrokh**, An evaluation of the effects of the N_2 /Ar gas flux ratio on various characteristics of TiC 0.3 N 0.7 nano-structure coatings on the cold work tool steel by pulsed DCPACVD, Surface and Coatings Technology, V366, P366-374, 2019

39-Shanaghi, Ali, Chu, Paul K, Ghasemi, Sajjad, **Ahangarani, Shahrokh**, Zhao, Ying, Effect of Ti interlayer on corrosion behavior of nanostructured Ti /TiN multilayer coating deposited, Materials and Corrosion, 2019

40-Maryam Kazemi, **Shahrokh Ahangarani**, Mohammad Esmailian, Ali Shanaghi, Investigation on the corrosion behavior and biocompatibility of Ti-6Al4V implant coated with HA/TiN dual layer for medical applications, Surface and Coatings Technology, V397, 2020.

Iranian scientific Papers

1**-Sh. Ahangarani**, A.R. sabour, F. Mahboubi, "Effects of various nitriding parameters on active screen and Conventional plasma nitriding behavior of 30CrNiMo8 low-alloy steel", Amirkabir international journal of Science & Technology, 2006, P 63-70.

2- Hamzeh Forati, Ahmad Ali Amadeh, **Sh. Ahangarani**, Effect of process parameters on the morphology and hardness of nitride layers in plasma nitriding of H11 hot working steel, surface engineering journal, 2010, P 67-

3- Ali Shanaghi, **Shahrokh Ahangarani**, Ali Reza Sabour Rouhaghdam, study of corrosion properties of titanium carbide coated by pulsed PACVD in 3.5% NaCl, science & engineering of Corrosion journal, 2011, P 37-48

4- Najme Iari, **Shahrokh Ahangaran** ,Ali Shanaghi, Behavior of multilayer nanocomposite titania-silica antireflective coatings by using sol-gel method, new processing in materials eng., 9(2015), 163-173.

5- Najme Iari, **Shahrokh Ahangaran** ,Ali Shanaghi, study of antireflective multilayer coatings by using sol-gel, 4(2015), 31-44.

SCIENTIFIC CONFERENCES

Iranian Conference Papers

1- **Sh. Ahangarani**, A.R. sabour, F. Mahboubi, "Effects of variou nitriding parameters on active screen plasma nitriding behavior, of a low-alloy steel", The 9nd Annual Congress of Metallurgical Society of Iran, Shiraz university, Nov. 12-14,2005 (in Persian).

2- **Sh. Ahangarani**, A.R. sabour, F. Mahboubi, "Study of a low-alloy steel behavior in active screen plasma nitriding treatments", Th ISSST, Esfahan University of Technology, Iran, May. 16-17, 2006(in Persian).

3- **Sh. Ahangarani**, T.Shahrabi " failure analysis of condenser tubes in steam power plant stations ", the 6nd National congress of Corrosion, Amir Kabir University of Technology, 14 Sep. 1999, (in Persian).

4- **Sh. Ahangarani**, A.R. sabour, "Corrosion behavior and Failur analysis of the first stage blades of a gas turbine ", The 8nd Annual Congress of Metallurgical Society of Iran, Esfahan university of Technology, Oct. 19 -20, 2004 (in Persian).

5- **Sh. Ahangarani**, A.R. sabour, "Failure analysis of the first stage blades of a gas turbine ", the 8nd National congress of Corrosion, University of Tehran, 2003 (in Persian).

6- H. Forati Rad, A. Amadeh, **Sh. Ahangarani** , "Effects of gas mixtures on the growth of nitride nano-particles and nitride layer properties in Pulse -plasma-nitrided AISI H11 steel", The 2nd international conference on nanotechnology 2008, 17-18 November

7- M. Montazeri, **Sh. Ahangarani**, M. Soltanieh, " Effect of Tpause/Tpulse parameter in the Pulsed DC discharge PACVD on TiN deposited behavior on the tools steels", The 9nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan Universit of Technology, Iran, May 2008 (in Persian).

8- H. Forati Rad, A. Amadeh, **Sh. Ahangarani**, " Effects of gas mixtures on the nitride layer properties in Pulse -plasma-nitrided AISI H11 steel", The 9nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Iran, May 2008 (in Persian).

9- **Sh. Ahangarani**, A.R. sabour, F. Mahboubi, The effect of active screen plasma nitriding parameters on corrosion behavior of 30CrNiMo8 low-alloy steel", The 9nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Irar May 2008 (in Persian).

10- H.Elmkhah, A.Abdollahzadeh, F.Mahbobi, **Sh.Ahangarani**, M.Raoufi, M.S.Mahdipoor, " Study of corrosion behavior of TiN nanostructur coatings producted by PACVD method", The 10nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Iran, May 2009 (in Persian).

11- M.S.Mahdipoor, F.Mahbobi, **Sh.Ahangarani**, M.Raoufi, "Effe of TiN-PN bi-layer on Surface properties of H11 steel by PACVD", The 10nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Iran, May 2009 (in Persian).

12- M. Velashjerdi, A.R. sabour, **Sh.Ahangarani**, "Effect of hold size of active screen on morphology of H11 steel by plasma nitriding The 10nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Iran, May 2009 (in Persian).

13- A. Shanaghi, A.R. sabour, **Sh.Ahangarani**, A, Mohamadi, H. Moradi, "Study of TiCx nano structured coatings by PACVD", The 10nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Iran, May 2009 (in Persian).

14- H. Moradi, Sh. Mirdamadi, F.Mahbobi, **Sh.Ahangarani**, M.S.Mahdipoor, H.Elmkhah, "Study of PN-TiN bi-layer deposition by PACVD method", The 10nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Irar May 2009 (in Persian).

15- A. Shanaghi, A.R. sabour, **Sh.Ahangarani**, A, Mohamadi, H. Moradi, "Effect of treatment Temperature on surface properties of TiCx nano structured coatings by PACVD", The 10nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan Universit of Technology, Iran, May 2009 (in Persian).

16- Gh. Saetchian, F.Mahbobi, **Sh.Ahangarani**, H. Moradi, M.S.Mahdipoor, "Effect of treatment temperature and duty cycle on tribologycal properties of TiN coatings by PACVD", The 10nd Iranian National Seminar on Surface Engineering & Heat Treatment, Esfahan University of Technology, Iran, May 2009 (in Persian).

17- M.Raoufi, Sh.Mirdamadi, F.Mahbobi, **Sh.Ahangarani**, M.Mehdipor, H.Elmkhah,Tribological study of TiN nano structured films deposited on plasma nitrided H11 steel by pulsed DC PACVD, The 13nd Annual Congress of Metallurgical Society of Irar 17 Nov 2009, Kerman, Iran (in Persian).

18- M.Mehdipor, Sh.Mirdamadi, F.Mahbobi, **Sh.Ahangarani**, M.Raoufi, H.Elmkhah, Effect of pre-plasma nitriding treatmenet of AIS H11 steel on Tribological behavior of TiN layer steel by pulsed DC PACVD, , The 13nd Annual Congress of Metallurgical Society of Iran, 1 Nov 2009, Kerman, Iran (in Persian).

19- H.Elmkhah, A.Abdollahzadeh, F.Mahbobi, **Sh.Ahangarani**, M.Raoufi, M.S.Mahdipoor, Study of nano coating microstructure on corrosion behavior of TiN thin film by PACVD, The 11nd National Seminar on Surface Engineering & 6nd international conference and exhibition of electroplating, Tehran, Iran, 14th-16th Oct 2010 (in Persian).

20- H.R. Shafie, A. Amadeh, **Sh. Ahangarani**, H. Moradi, M.S.Mahdipoor, Effect of N_2/H_2 ratio on tribological properties of TiN coating on DIN 1.3355 Steel plasma nitrided by PACVD. The 11nd National Seminar on Surface Engineering & 6nd international conference and exhibition of electroplating, Tehran, Iran, 14th-16th Oct 2010 (in Persian).

21- Ali Shanaghi, **Shahrokh Ahangarani**, Ali Reza Sabour Rouhaghdam, Study of process temperature on nanostructure coatings product by PACVD method ", the 12nd National congress of Corrosion, Tehran, 2011 (in Persian).

22- Ali Shanaghi, **Shahrokh Ahangarani**, effect of treatment temperature on the coating properties of glass tubes of solar power plants The 5nd Annual Congress of Metallurgical Society of Iran, 2011 (in Persian)

International Conference Papers

23- H. Forati Rad, A. Amadeh, **Sh. Ahangarani** , "Effects of gas mixtures on the growth of nitride nano-particles and nitride layer properties in Pulse -plasma-nitrided AISI H11 steel", The 2nd international conference on nanotechnology 2008, 17-18 November

24- H. Forati Rad, A. Amadeh, **Sh. Ahangarani**, "Effects of the process parameters on the formation of nanoparticles in plasma nitriding of hot working steel", The 2nd international conference on nanotechnology 2008, 17-18 November.

25- A. Shanaghi, A. R. Sabour, **S. Ahangarani**, H. Moradi, A. Mohamadi, Effect of operating temperature on structure properties TiCx nanoparticle coating applied by PACVD, 2nd International Conference on Ultrafine grained & Nanostructured materials,Iran,Tehran, 2009.

26- H. Elmkhah, A. Abdollah Zadeh, F. Mahboubi, **Sh. Ahangarani**, M. Raoufi , M. S. Mahdipoor **,** Corrosion behavior of TiN Nanostructure coatings deposited by PACVD method, 2nd International Conference on Ultrafine grained & Nanostructured materials,Iran,Tehran, 2009.

27- M.Raoufi, Sh.Mirdamadi, F.Mahbobi, **Sh.Ahangarani**, M.Mehdipor, H.Elmkhah, Tribological study of binary PN-TiN nano structured films deposited on H11 steel by pulsed DC PACVD, The International Conference on Advances in Materials and Processing Technologies 2009 (AMPT2009).

PATENTS

10 patents registered in Iran (7 patents registered in the Real Estate Registration Organization of Iran and 3 patents registered in the Iranian Research and Organization for Science and Technology (IROST) by Shahrokh Ahangrani et al).

1- M. Raoufi, **Sh. Ahangarani**, M.S. Mahdipoor, F. Mahboobi, Creation of hard coatings of TiN nanostructure by vapor phase chemical deposition method using plasma on steel, Real Estate Registration Organization of Iran, 2009.

2- A. Shanaghi, A.R. Sabour Rouhaghdam, **Sh. Ahangarani**, Application of titanium carbide nanostructure coating by CVD plasma method, IROST, 2009.

3- M. Bozorg, **Sh. Ahangarani**, A.R. Sabour Rouhaghdam, H. Hedaiatmofidi, Creation of titanium metal coating by chemical deposition of vapor phase using plasma. Creation of TiN nanostructure layer by titanium mesh during plasma nitriding by active screen method, IROST, 2014.

4- M. Velashjerdi, A.R. Sabour Rouhaghdam, **Sh. Ahangarani**, Formation of TiN nanostructure layer by titanium mesh during active screen plasma nitriding method, Real Estate Registration Organization of Iran, 2009.

5- M. Velashjerdi, A.R. Sabour Rouhaghdam, **Sh. Ahangarani**, Creation of AlN nanostructured layer by active screen plasma nitriding method using aluminum mesh, Real Estate Registration Organization of Iran, 2009.

6- M.S. Mahdipoor, F. Mahboubi, **Sh. Ahangarani**, M. Raoufi, H. Elmkhah, Development of wear-resistant titanium nitride nanostructured coatings on industrial steel parts, Real Estate Registration Organization of Iran, 2010.

7- H. Elmkhah, A. Abdolazadeh, F. Mahboubi, **Sh. Ahangarani**, M. Raoufi, M.S. ahdipoor, Formation of corrosion-resistant nitride nanostructured coatings on steel parts, Real Estate Registration Organization of Iran, 2010.

8- H. Forati, A. A. Amadeh, **Sh. Ahangarani**, et al, Formation of nitride layers on H11 steel, Real Estate Registration Organization of Iran, 2008.

9- H. Forati, A. A. Amadeh, **Sh. Ahangarani**, et al, Creation of nano-nitride coatings on hot working steels, Real Estate Registration Organization of Iran, 2008.

10- **Sh. Ahangarani**, N.lari, A. Shanaghi, Preparation of six-layer anti-reflective coating of titania-silica sandwich by sol-gel method, IROST, 2016.