

Sedigheh Sadegh Hassani

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Education

PhD. Degree: Electrochemistry, University of Tehran, 2014-2018.

"Synthesis and optimization of nano-catalysts based on doped graphene for oxygen reduction reaction in fuel cell"

M.S. Degree in Analytical Chemistry, Tarbiat Moallem University, Tehran, Iran 1988-1991.

"Recovery of platinum and rhenium from spent reforming catalysts"

B.Sc. in Chemistry, Kharazmi University, Tehran, Iran 1984-1988.

Employment

Catalyst Research Center	Researcher	2001-2006
Nanotechnology research center	Researcher	2006-2017
Catalyst Research Center	Researcher	2017-2022
Aral Tajhiz Azma company	R& D manager	2022-present

Professional Membership

Research Councilor of the Research Institute of Petroleum Industry (RIPI)	2006-2008
Delegate of RIPI to Iran nanotechnology laboratory network	2006-2019
Head of SPM teamwork in Iran	2011-present
Manager of Catalyst preparation Department	2019-2022
Research and development manager	2022-present

Research interests

Nanotechnology, Scanning Probe Microscopy, Electrochemistry & Heterogeneous Catalysis.

Presentations

1. Force nano-lithography on various surfaces by atomic force microscope, Second Conference on Nanostructures, S. Sadegh Hassani, Z. Sobat and H.R. Aghabozorg, March 11-14, 2008, Kish University, Kish Island, Iran.
2. Enhancing the Antiwear Ability of Lubricating Oils by Inorganic Nanoparticles, E. Ebrahimpoor Ziaie, A. Barkhordarian, M. R. Kashani- S. Sadegh Hassani, 1st Congress on Nanotechnology & its Applications in Petroleum, Gas and Petrochemical Industries 7-8 March 2007 Tehran Iran.
3. The study of the Lubrication Behavior by Atomic Force Microscopy, E. Ebrahimpoor Ziaie, D. Rachtchian, S. Sadegh Hassani, First International Congress on Nanoscience and Nanotechnology Faculty of Engineering, University of Tehran 18-20 December 2006.
4. Atomic Force Microscopy as a Tool for Comparing Lubrication Behavior of Lubricants, E. Ebrahimpoor Ziaie, D. Rachtchian, S. Sadegh Hassani, IV International Conference on Tribochemistry, October 3-5, 2005 Poland.

5. Recovery of platinum and rhenium from spent reforming catalyst, M.H. Peyrovi, S. Sadegh Hassani, M. Aghababaei, G.H. Nafisi, 4th oil, gas and petrochemical congress 1991, Isfahan, Iran.
6. Synthesis and characterization of nano zeolite L crystal, S. Sadegh Hassani, F. Salehirad, H.R. Aghabozorg and Z. Sobot, 2th International Congress on Nanoscience and Nanotechnology" Tabriz, Iran.
7. Early Stage of dezincification in leaded-Brass alloy investigated by AFM and XPS, M. Ahangar Davoodi, S. Sadegh Hassani, H.R. Aghabozorg and M.M. Ahadian, 2th International Congress on Nanoscience and Nanotechnology, Tabriz, Iran.
8. Synthesis and characterization of SiO₂-nanotube hybrides using a Sol-Gel method, N. Montakhab, S. Sadegh Hassani, A.M. Rashidi, M.R. Aboutalebi, H. Arabi, 3th International Conference on UltraFine Grained and Nanostructured Materials, Nov.2011, University of Tehran, Iran.
9. Synthesis of SiCNT nanocoposit and their application as H₂ gas adsorbent, N. Montakhab, H. Arabi, S. Sadegh Hassani, M. R. Aboutalebi, A. M. Rashidi, M. Alizadeh, 4th International Conference on Nanostructures, March.2012, Kish Island.
10. Characterization of size and antiwear ability of Molybdenum disulfide nanoparticles, E. Ebrahimpoor Ziaie, S. Sadegh Hassani and A. Tofigh, International conferences of manufacturing and optimization, 2012, Beijing, China.
11. The Study of chemical properties of surfaces using Chemical Force Microscopy (CFM), J. Afzali, S. Sadegh Hassani, M. Hesam, The 2th educational conferences on nanotechnology, 13-16 March 2013, Shiraz University.
12. Investigation of electrical properties of metallic nanostructures using Kelvin force microscopy, S. Sadegh Hassani, S. Tasharrofi, The 2th educational conferences on nanotechnology, 13-16 March 2013, Shiraz university.
13. Synthesis and application of colloidal nano-silica particle on the performance of drilling mud, S. Sadegh Hassani, M. Fardi, M. Soleimani, S.Rayatdoost, A.M. Rashidi, 6th international conference on nanostructure, 7-10 March 2016, Kish Island, Iran.
14. Removal of 4-chlorophenol from waste water using carbon nanotubes as adsorbents, S. Madannejad, S. Sadegh Hasani, A.M. Rashidi, F. Shemirani, 6th international conference on nanostructure, 7-10 March 2016, Kish Island, Iran.
15. Investigation of silica-multiwall carbon nanotubes hybrid nanostructures on the performance of drilling mud, S. Sadegh Hassani, A.M. Rashidi, M. Soleymani, A. Amrollahi, S. Rayatdoost, 6th international conference on nanostructure, 7-10 March 2016, Kish Island, Iran.
16. A Revolution in Optimum Well Drilling Synthesis and experimental characterization of Nano Carbon-Based Additive on flow behavior, filtration loss control and thermal stability of water based drilling fluids, S. Rayatdoost, M. Soleymani, S. Sadegh Hassani, M.H. Akhlaghi, M. Jalalian, 6th international conference on nanostructure, 7-10 March 2016, Kish Island, Iran.

17. Preparation of Ag catalyst with highly dispersed silver nanoparticles, F. Salehirad, S.K. Masoudian, S. Sadegh Hassani, M.R. Ghasemi, 2th national conference and workshop on nanoscale and nanotechnology, 19-20 May 2015.
18. Comparative Study of Pyrolysis and Hydrothermal Method for Preparation of the N, S-Doped Graphene for the Oxygen Reduction Reaction, L. Samiee, S. Sadegh Hassani, M.R. Ganjali, A. M. Rashidi., K. Kashefi, M. Ayazi, 4th Hydrogen and Fuel Cell Conference, 9-10 May 2017, University of Tehran, Iran.
19. High performance N-Doped Porous Graphene for the Oxygen Reduction Reaction, S. Sadegh Hassani, L. Samiee, S. Tasharrofi, E. Ghasemi, A. M. Rashidi., M.R. Ganjali, M. Dehghani Mobarakeh, 4th Hydrogen and Fuel Cell Conference, 9-10 May 2017, University of Tehran, Iran.
20. Experimental and Density Functional Theory Study of O₂ Adsorption on N-Doped Graphenes, Z. Yousefian, S. Sadegh Hassani, L. Samiee, M.R. Ganjali, A.M. Rashidi, 7th international congress on nanoscience and nanotechnology (ICNN 2018), 26-28 Sep. 2018, Research institute of petroleum Industry, Tehran, Iran

Publications

1. Application of Atomic Force Microscopy for the Study of Friction properties of surfaces, S. Sadegh Hassani- E. Ebrahimipour Ziaie, Materials Science: An Indian Journal - Volume 2 Issue 4-5 November (2006) 134-141.
2. Atomic force microscopy as a tool for comparing lubrication behavior of lubricants, E. Ebrahimipour Ziaie- D. Rachtchian- S. Sadegh Hassani, Materials Science: An Indian Journal - Volume 4 Issue 2 January (2008) 111-115.
3. Scanning probe lithography as a tool for studying of various surfaces, S. Sadegh Hassani, Z. Sobat, H.R. Aghabozorg, Nano science and nanotechnology: An Indian Journal - Volume 2 Issue (2-3) December (2008) 94-98.
4. Recovery of platinum and rhenium from spent reforming catalyst, M.H. Peyrovi, S. Sadegh Hassani, M. Aghababaei, G.H. Nafisi, Tahghigh, No. 16.7 spring (1995) 1-14.
5. Nanometer-scale patterning on PMMA resist by force microscopy lithography, S. Sadegh Hassani, Z. Sobat, H.R. Aghabozorg, Iran. J. Chem. Chem. Eng. (IJCCE) Vol. 27, No. 4, (2008) 29-34.
6. Force nanolithography on various surfaces by atomic force microscope, S. Sadegh Hassani, Z. Sobat, H.R. Aghabozorg, Int. J. Nanomanufacturing, Vol. 5, No. 3/4, (2010) 217-224.
7. Nano-sized silver crystals and their dispersion over α -alumina for ethylene epoxidation, S. Sadegh Hassani, M.R.Ghasemi, M.Rashidzadeh and Z. Sobat, Cryst. Res. Technol. 44, No.9, (2009) 948-952 .
8. Synthesis and morphology of nanosized zeolite L, S. Sadegh Hassani, F. Salehirad, H.R. Aghabozorg and Z. Sobat, Cryst. Res. Technol. 45, No. 2, (2010) 183-187.

9. Studying of various nanolithography methods by using Scanning Probe Microscope, S. Sadegh Hassani and Z. Sobat, *Int. J. Nano. Dim.* 1(3): (Winter 2011)159-175.
10. Self-assembly of insoluble porphyrins (tetraphenylporphyrin) on Au (111) under electrochemical control, S. Sadegh Hassani, Y.G. Kim and E. Borguet, *Langmuir* 2011, 27, 14828–14833.
11. Alpha Alumina Support and Ethylene Oxide catalyst preparation ($\text{Ag}/\alpha\text{-Al}_2\text{O}_3$) with high dispersion of nano silver particles, S. Sadegh Hassani, M. R. Ghasemi, M. Rashidzadeh and S. K. Massoodian, *journal of mechanical Eng.*, vol.39, No. 2 Autumn and winter 2009.
12. Characterization of size and antiwear ability of Molybdenum disulfide nanoparticles, E. Ebrahimpoor Ziaie, S. Sadegh Hassani and A. Tofigh, *Advanced material research*, vol 622-623(2013) 838-841.
13. Characterization of size and antiwear ability of nickel and copper nano particles, E. Ebrahimpoor Ziaie, S. Sadegh Hassani, A. Barkhordariion and M. Shirkhani, (2013). 7(6), 2013 224-228.
14. Synthesis and characterization of SiO_2 -Carbon nanotube hybrid using a Sol-Gel method, N. Montakhab, S. Sadegh Hassani, R. Rashidi, M.R. Aboutalebi, H. Arabi, *Journal of ultrafine and nanostructured materials*, Vol 45, ,No.1,2012,29-34
15. Facile and economic method for preparation of nano-colloidal Silica with controlled size and stability, S. Sadegh Hassani, A.M. Rashidi, M. Adinehnia, N. Montakhab, *Int. J. Nano. Dim*, Volume 5, Issue 2, spring (2014), 177-185.
16. Characterization of Size and Antiwear Ability of Molybdenum Disulfide, Nanoparticles, E. Ebrahimpoor Ziaie, S. Sadegh Hasani, A. Tofigh, *Advanced Materials Research Vols. 622-623 (2013) pp 838-841*, Trans Tech Publications, Switzerland.
17. An overview of scanning near field optical microscopy in characterization of nanomaterials, Z. Sobat, S. Sadegh Hassani, *Int. J. Nano. Dim*, Volume 5, Issue 3, 2014, 203-308.
18. Determination of elastic modulus of biological samples using atomic force microscope, N. Hashemian, S. Mirjalili, S. Sadegh Hassani and Z. Sobat, *Iranian chemical engineering journal*, Vol. 13, No. 74 (2014) 36-43.
19. Obtaining high resolution magnetic images using carbon nanotube, S. Sadegh Hassani, J. Afzali and A.M. Rashidi, *Journal of applied research in chemistry*, Vol.8, No.1, (2014) 41-48.
20. Magnetic Force Microscopy using fabricated cobalt-coated carbon nanotubes probes, J. Afzali, S. Sadegh Hassani, *Iran. Chem. Commun.* 3 (2015) 266-275.
21. Investigation of torsional deflection as an undesired motion in atomic force microscopy with sidewall probe, F. Mokhtarinezhada, Ro. Abd. Rahmana, S. Eftekhar, S. Sadeghj Hassani, *Jurnal Teknologi*, 72:1 (2015) 1–6.

22. The effect of nanoparticles on the heat transfer properties of drilling fluids, S. Sadegh Hassani, A. Amrollahi, A.M. Rashidi, M. Soleymani, S. Rayatdoost, *Journal of Petroleum Science and Engineering*, 146 (2016) 183–190.
23. Scanning impedance microscopy (SIM): A novel approach for AC transport imaging, M. Fardi, S. Sadegh Hassani, *International Journal of Nano Dimension*, 7:4, 2016, 278-283.
24. Comparable study of 4-chlorophenol removal from petroleum wastewater using mesoporous and microporous carbons: Equilibrium and kinetics investigations, S. Sadegh Hassani, S. Mdannejad, S. Tasharrofi, L. Samiee, A.M. Rashidi, *Journal of petroleum and environmental biotechnology*, 7:4, 2016, 1-8.
25. Adsorption of naphthalene by carbon mesoporous (CMK-3) from aqueous solutions, L. Samiee, A. Yadegari, S. Tasharrofi, A. Hosseinia, S. Sadegh Hassani, *Journal of Applied Chemical Science International* 7(3): 168-180, 2016.
26. Scanning hall probe microscopy technique for investigation of magnetic properties, Z. Sobat, S. Sadegh Hassani, M. Ghalbi Ahangari, S. Kiani, A. Mehdizadeh, *International Journal of Nano Dimension*, 6:4, 2015, 329-337.
27. Novel and economic approach for synthesis of mesoporous silica template and ordered carbon mesoporous by using cation exchange resin, L. Samiee, S. Tasharrifi, S. Sadegh Hassani, M. Fardi and B. Mazinani, *Current nanoscience*, 13, 2017, 595-603.
28. Comparative study of various types of metal free N and S co-doped porous graphene for high performance oxygen reduction reaction in alkaline solution, S. Sadegh Hassani, M.R. Ganjali, L. Samiee, A.M.Rashidi, S.Tasharrofi, A.Yadegari, F.Shoghi and R.Martel, *J. Nanoscience and nanotechnology*, 18, 2018, 4565–4579.
29. Removal of 4-chlorophenol from water using different carbon nanostructures: A comparison study, S. Madannejad, A.M. Rashidi, S. Sadegh Hassani, F. Shemirani, E. Ghasemy, *Journal of Molecular Liquids*, 249, 2018, 877-885.
30. Facile synthesis of N, S-doped graphene from sulfur trioxide pyridine precursor for the oxygen reduction reaction, L. Samiee, S. Sadegh Hassani, M.R. Ganjali, A. M. Rashidi, *Iranian Journal of Hydrogen & Fuel Cell* 3(2017) 231-240.
31. Porous nitrogen-doped graphene prepared through pyrolysis of ammonium acetate as an efficient ORR nanocatalyst, S. Sadegh Hassani, L. Samiee, E. Ghasemy, A.M. Rashidi, M.R. Ganjali, S. Tasharrofi, *international journal of hydrogen energy* 43 (2018) 15941 -15951
32. Efficient Electrocatalyst based on Platinum Incorporated into N,S co-doped Porous Graphene for Oxygen Reduction Reaction in Microbial Fuel Cell, S. Sadegh Hassani, M.R. Ganjali, L. Samiee and A.M. Rashidi, *Int. J. Electrochem. Sci.*, 13 (2018) 11001 – 11015.

33. One Step Synthesis of Tertiary Co-doped Graphene Electrocatalyst Using Microalgae *Synechococcus elangatus* for Applying in Microbial Fuel Cell, S. Sadegh Hassani, A. Ziaedini, L. Samiee, M. Dehghani, M. Mashykeh, M. A. Faramarzi, *FUEL CELLS* 19, 2019, No. 5, 623–634.
34. Advanced Development in Upstream of Petroleum Industry using Nanotechnology, S. Sadegh Hassani, Maryam Daraee, Zahra Sobat, *Chinese Journal of Chemical Engineering*, 28, (6) 1483-1491, 2020, <https://doi.org/10.1016/j.cjche.2020.02.030>.
35. Use of Grape Leaves for Producing Graphene for Use as an Oxygen Reduction Electrocatalyst, S. Sadegh Hassani, M.R. Ganjali, L. Samiee and A.M. Rashidi, *Int. J. Electrochem. Sci.*, 15 (2020) 4754 – 4773.
36. Application of atomic force microscopy in adhesion force measurements, Sedigheh Sadegh Hassani, Maryam Daraee & Zahra Sobat, *Journal of Adhesion Science and Technology*, 35 (3) 2020, 221-241, 10.1080/01694243.2020.1798647
37. N and S Co-doped Ordered Mesoporous Carbon: An Efficient Electrocatalyst for Oxygen Reduction Reaction in Microbial Fuel Cells Leila Samiee and Sedigheh Sadegh Hassani *Current Nanoscience*, 2020, 16, 619-631
38. Efficient removal of dyes and proteins by nitrogen-doped porous graphene blended polyethersulfone nanocomposite membranes, Vahid Vatanpour, Seyed Soroush Mousavi Khadem, Ahmad Dehqan, Mohammed A. Al-Naqshabandi, Mohammad Reza Ganjali, Sedigheh Sadegh Hassani, Mohammad Reza Rashid, Mohammad Reza Saeb, Nadir Dizge, *Chemosphere*, Volume 263, January 2021, 127892
10.1016/j.chemosphere.2020.127892
39. Facile and economic synthesis of heteroatoms co-doped graphene using garlic biomass as a highly stable electrocatalyst toward 4 e- ORR, S. Sadegh Hassani, L. Samiee, M. R. Ganjali, A. M. Rashidi, *Journal of the Iranian Chemical Society*, <https://doi.org/10.1007/s13738-021-02306-9>, 2021
40. Green synthesis of heteroatom doped graphene from natural and chemical precursors for the oxygen reduction reaction Sedigheh Sadegh Hassani, & Leila Samiee, *Indian Journal of Chemical Technology* Vol. 28, July 2021, 1-11
41. Comparative Study of Various Preparation Methods of Metal-Free N and S Co-Doped Porous Graphene As an ORR Catalyst in Alkaline Solution, Sedigheh Sadegh Hassani, Leila Samiee, Alimorad Rashidi and Mohammad Reza Ganjali, *Journal of chemical society*, 134, 27 (2022) 1-11.
42. Modified Praseodymium Sensor based on Nitrogen and Sulfur Doped Porous Graphite, Morteza rezapour, Alimorad Rashidi, Sedigheh Sadegh Hassani, *Anal. Bioanal. Electrochem.*, Vol. 14, No. 5, 2022, 523-534.

Lecture & Workshop

1. Workshop on "Nano structures identification by SPM, 3th nano workshop" on Fouman faculty of engineering, Fouman University, Iran, 2013.

2. Workshop on "Introduction to Theory, principle and applicatopn of nanomaterials, 4th international conference on Ultrafine grained and nanostructured materials (UFGNSM), Tehran university, Iran, 2013.
3. Workshop on scanning probe microscopy, 10th international seminar on polymer science and technology (ISPST), Amir Kabir University, iran, 2012.
4. Workshop on scanning probe microscopy, on Fouman faculty of engineering, Fouman University, Iran, 2012.
5. SPM training software, INLN, 2013.
6. Workshop on "Introduction to AFM technique and sample preparation, Jondishapoor University (Ahvaz), 2017.

Books (Persian)

1. S. Sadegh Hassani, Scanning tunneling microscopy and its application under electrochemical conditions, spring 2011, RIPI Publisher (second edition 1392).
2. S. Sadegh Hassani, J. Afzali and M. Khosravi, Atomic force microscopy, Gisoom publisher Aug. 2014.
3. P. Hadian, Z. Sobat, S. Sadegh Hassani, Scanning near field optical microscopy, Kamal Andisheh Publisher, 2019.
4. A.M. Rashidi, S. Sadegh Hassani, M. Daraee, Carbon Nanostructures, with emphasis on carbon nanotubes and industrial applications, RIPI Publisher, 2019

Chapter Books (Eng.)

1. S. Sadegh Hassani and H.R. Aghabozorg, Recent Advances in Nanofabrication Techniques and Applications, Chapter title: Nanolithography Study Using Scanning Probe Microscope, InTech publisher, December, 2011.
2. H.R. Aghabozorg, S. Sadegh Hassani and F. Salehirad, Modern Aspects of Bulk Crystal and Thin Film Preparation, Chapter title: Crystal growth study of nano-zeolite by Atomic Force Microscopy, InTech publisher, January, 2012.
3. H.R. Aghabozorg, S. Sadegh Hassani, and A.M. Rashidi, Nanocatalysts—Preparation, Characterization, and Their Application in Oil and Gas Processes, CRC encyclopedia, Taylor and Fransis publisher, 2015, page 100-107.
4. S. Sadegh Hassani, S. Tasharrofi, and Z. Sobat, Kelvin Probe Force Microscopy as a Tool for the Characterization of Nanomaterials, CRC encyclopedia, Taylor and Francis publisher, 2015, page 391-397.

5. H.R. Aghabozorg and S. Sadegh Hassani, *Advanced Environmental Analysis, Applications of Nanomaterials*, Chapter title: "Removal of pollutants from environment using sorbents and nanocatalysts", RSC publisher, Edited by Chaudhery Mustansar Hussain and Boris Kharisov, 2016.
6. A.M. Rashidi, F. Mohammadzadeh, S. Sadegh Hassani, *Nanotechnology in Oil and Gas Industries*, Chapter title: Hydrodesulfurization (HDS) Process Based on Nano-catalysts: The Role of Supports, Springer, 2018, 193-210, DOI: 10.1007/978-3-319-60630-9_7.
7. S. Sadegh Hassani and L. Samiee, *Carbon Nanostructured Catalysts as High Efficient Materials for Low Temperature Fuel Cells*, Handbook of Ecomaterials, Springer, 2018, 1-15.
8. H. Mosmeri, S. Tasharrofi, E. Alaie, S. Sadegh Hassani, *Controlled-Release Oxygen nano-composite for bioremediation of benzene contaminated groundwater*, New polymer nanocomposites for environmental remediation, Chapter 23, Elsevier, 2018, 201-622.
9. S. Tasharrofi, S. Sadegh Hassani, H. Taghdisian and Z. Sobat, *Environmentally friendly stabilized nZVI-composite for removal of heavy metals* New polymer nanocomposites for environmental remediation, Chapter 24, Elsevier, 2018, 224-643.
10. S. Sadegh Hassani, M. Daraee, A.M. Rashidi, *Application of Graphene-(polymer and ceramic) nano-composite in oil and gas industry*, Handbook of Polymer and Ceramic Nanotechnology, Springer Nature Switzerland AG 2019, 1-29.
https://doi.org/10.1007/978-3-030-10614-0_33-1.

Professional training courses

- Workshop on Mossbauer Spectroscopy and Synchrotron Radiation and Their Applications in Material Sciences Iran.
- Basics, Structure & Documentation of General Requirements for the Competence of Testing and Calibration Laboratories in accordance with EN ISO/IEC 17025:2005 Iran.
- The Workshop of "Scanning Probe Microscopy (SPM)", Iran.
- Brainstorming on "Interactively Discussion Over Selecting Creative R&D Projects" Iran.
- OHSAS 18001 Seminar, Iran.
- ISO 29001 Seminar, Iran.
- Training Workshop on "Hydroprocessing / Catalytic Reforming" Iran.
- Training Workshop on "Hydroprocessing / Hydrocracking" Iran.
- The Workshop on "Application of Molecular Sieves in Gas Separation" Iran.
- The Workshop on "Preparation & Characterization of Nanosized Noble Metals Catalysts & Application for HAH, Iran.
- The Workshop on "The Preparation & Characterization of Titanium Oxide based Photocatalysts as well as their Application for better our Environment" Iran.
- MSDS Seminar, Iran.
- ISO 9000: 2000, Iran.
- The Workshop on "Carbon Nanotubes for Gas Storage and Separation" Iran.
- Chemometrics courses, Iran.
- Nanotechnology courses, Iran.

- TEM course, Iran.
- SPM training in NT-MDT Company, Russia.
- Certificate of training from Japan cooperation center petroleum (JCCP) Japan.
- High resolution electrochemical scanning tunneling microscopy, Borguet group, Chemistry Department, Temple University, Philadelphia, USA.

Technical Expertise

- Scanning tunneling microscopy (MI, Agilent)
- Atomic Force microscopy (NT-MDT, Agilent)
- Catalyst synthesis and characterization
- Nanomaterial synthesis and characterization

Awards

- The best expert of SPM in the Iran nanotechnology laboratory network (3 times) 2006-2009
- I ranked third in 4th Zagros innovation and development festival, Iran 2014.
- The best women researcher 2 times in RIPI.

Patent

- Increasing the resolution of magnetic images Using CNT tip, 76194, 3.5.1391, J. Afzali, S.Sadegh Hassani and A.M. Rashidi.