CONTACT

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Razi University, Taq-e Bostan, Kermanshah, Iran

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RESEARCH INTERESTS

- DFT
- Novel 2D materials
- Thermal Properties
- Optical properties
- Third-harmonic generation
- Phonon dispersion

LANGUAGES

- Persian: Native/Excellent
- English (Intermediate)
- Arabic (Intermediate)

Software Skills

- MATLAB
- Mathematica
- Wien2K
- Quantum Espresso
- Siesta
- JDFTX+

Raad Chegel

Biography

Dr. Raad Chegel is a faculty member in the Physics Department at Razi University of Kermanshah. He holds a PhD in Nano-Optics and an MSc in Theoretical Optics from the same university. As a theoretical physicist, his research focuses on the electronic, optical, and thermal properties of pure and doped nanostructures. He investigates the effects of doping, external fields, and strain on the linear and nonlinear properties of two-dimensional materials, nanotubes, and nanoribbons. His work also explores the optical and thermal characteristics of these materials for potential applications in optoelectronics and thermoelectrics. Recently, his interests have expanded to nonlinear optics and its applications in advanced electronics and energy technologies.

RESEARCH INTERESTS & CURRENT STUDIES

- Novel 2D materials under the influence of doping, strain, and external fields
- Linear and nonlinear optical responses in graphene-like systems
- Strain-induced effects in non-carbon nanotubes and nanoribbons
- Third-harmonic generation in nanotubes
- Phonon dispersion and lattice dynamics using tight-binding models
-

Software Skills:

- Computational Tools: MATLAB, Mathematica, FORTRAN 77.
- Quantum Simulation: Wien2K, Siesta, Quantum Espresso, JDFTX+.

Awards:

- Outstanding Physics Researcher (Malayer University) (2012)
- Distinguished Researchers of Hamedan Province (2013)
- Outstanding Researcher, Faculty of Basic Sciences (2014)
- Outstanding Physics Researcher (Malayer University) (2018)
- Outstanding Physics Researcher (Malayer University) (2019)
- Distinguished Researcher (Malayer University) (2023)
- Distinguished Researchers of Hamedan Province (2024)
- Listed in Top 2% Scientists Worldwide (2024)

EDUCATION AND QUALIFICATION

PhD in Nano Optics, Department of Physics, Faculty of Science, Razi University, Kermanshah, Iran (February 2010).

TITLE:
Investigation of dielectric function of carbon nanotube and Structural and electronic properties of bundled nanotubes. [**Subject-class:** Carbon Nanotube-Tight binding approximation]

MSc in Quantum Optics, Department of Physics, Faculty of Science, Razi University, Kermanshah, Iran (February 2006).
TITLE:
Investigation of dielectric function of carbon nanotube and Structural and electronic properties of bundled nanotubes. [**Subject-class:** quantum optics]

Teachings

B.S.

- General Physics
- Mathematical Physic
- Analytical Mechanics
- Electricity and magnetism
- Quantum Mechanics
- Waves
- Numerical Analysis
- Thermodynamics

M.Sc.

- Classical Electrodynamics
- Modern Quantum Mechanics
- Quantum Optics (Loudon)
- Nonlinear Optics
- Quantum theory of the optical and electronic properties of semiconductors
- Photonic

Ph.D.

- Many-Particle Physics
- Advance Quantum Optics

PUBLICATIONS:

Journal Papers:

1. **Chegel, Raad,** Anisotropy in absorption and quadratic electro-optic response of monolayer boron arsenide under strain, Materials Science in Semiconductor Processing 196, 109671, **2025**

2. **Chegel, Raad,** Strain tuning of optical and thermoelectric properties of monolayer BAs, Scientific reports 15 (1), 16227, **2025**

3. **Chegel, Raad,** Linear and Third-Order Nonlinear Optical Properties of Germanene Nanotubes, Physica E: Low-dimensional Systems and Nanostructures**,** 116171**, 2024**

4. **Chegel, Raad,** Comparative Study of Third harmonic generation in Carbon and Silicene Nanotubes under Magnetic Fields, Scientific Reports, 14 (1), 31227, **2024**

5. **Chegel, Raad,** Theoretical Investigation of Enhanced Nonlinear Optical Properties of Silicene and Carbon Nanotubes: Potential Applications in Infrared and Ultraviolet Optoelectronics, Journal of Luminescence 277, 120923, **2024**

6. **Chegel, Raad**, A Zarifi, MR Jalal, Chirality and magnetic field engineering of linear and quadratic electro-optic properties in Silicene nanotubes for advanced optoelectronic applications, Physica B: Condensed Matter 694, 416435, **2024**

7. **Chegel, Raad,** Magnetic field-engineered optical nonlinearity in germanene nanotubes, Journal of Optics 26 (12), 125501, **2024**

8. **Chegel, Raad,** Unlocking and optimizing the thermodynamic potential of tetragonal Si and Ge: Strategies and insights from a tight-binding simulation framework for material engineering, Results in Physics 63, 107852, **2024**

9. Somayeh Behzad**, Chegel, Raad,** A hybrid density functional study of tensile-induced changes in phonon dispersion, electronic structure and optical absorption of bilayer BN for optoelectronic applications, Results in Physics 59, 107609, **2024**

10. Somayeh Behzad**, Chegel, Raad,** Tunability of electronic and thermoelectric properties of hexagonal boron nitride with carbon impurities under magnetic field: Tight binding investigation, Journal of Molecular Graphics and Modelling, 108679, **2024**

11. Somayeh Behzad**, Chegel, Raad,** Tailoring Thermoelectric Properties through Carbon Doping and Magnetic Field Variation: A Comparative Study in 2D h-BN and h-SiC, Chinese Journal of Physics 87, 398-414, **2024**

12. Somayeh Behzad**, Chegel, Raad,** The evolution of penta-graphene thermoelectrics: External fields as a key enabler for High-Performance devices, Materials Science and Engineering: B 300, 117082, **2023**

13. **Chegel, Raad,** Remarkable thermopower property enhancement in two-dimensional SiC via B and N doping and magnetic field, Journal of Alloys and Compounds, 976, 171682, **2023**

14. Somayeh Behzad, **Raad Chegel,** Optimizing thermoelectric performance of carbon-doped h-BN monolayers through tuning carrier concentrations and magnetic field, Sci Rep 13, 19623, **2023**

15. **Chegel, Raad,** Somayeh Behzad, Penta graphene: Investigating the role of external fields and electron/hole doping in enhancing transport performance, Physica E, 156, 115859, **2023**

16. **Chegel, Raad,** Tunable band gap and enhanced thermoelectric performance of tetragonal Germanene under bias voltage and chemical doping, Scientific Reports, 13, 12023, **2023**

17. **Chegel, Raad**, Somayeh Behzad, Ahmad I. Ayesh, Tetragonal silicene: A study of field-dependent transport responses, Materials Science in Semiconductor Processing, 166, 107711, **2023**

18. **Chegel, Raad,** External magnetic field effects on the thermoelectric and thermodynamic properties of doped monolayer S-graphene: A theoretical study, Physica B: Condensed Matter, 667, 415177, **2023**

19. **Chegel, Raad**, Exploring the electronic and thermal properties of S-graphene: robustness effects, magnetic fields, and doping, Applied Physics A, 129, 535, **2023**

20. **Chegel, Raad;** Magneto-electronic and thermopower properties of B, N and Si doped monolayer graphene, Diamond and Related Materials, 137, 110154, **2023**

21. **Chegel, Raad**; Combined effect of stacking and magnetic field on the electrical conductivity and heat capacity of biased trilayer BP and BN, Journal of Molecular Graphics and Modelling, 121, 108372, **2023**

22. **Chegel, Raad**; Modulating the electronic properties and thermal conductivity of trilayer BX (X= N, P) by bias voltage and magnetic field, Physica B: Condensed Matter, 659, 414822, **2023**

23. **Chegel, Raad**; Significant modification of the electronic structure of biased trilayer SiC and BN via magnetic field to achieve enhanced thermoelectric performance, Materials Science and Engineering: B, 295, 116573, **2023**

24. Behzad, Somayeh; **Chegel, Raad**; Engineering the light absorption spectrum and electronic properties of black and blue phases of a SiSe monolayer via biaxial straining, Journal of Computational Electronics, 11-Jan, **2023**

25. Aghaiimanesh, Ziba; **Chegel, Raad**; Ghobadi, Nader; Thermal Conductivity and Heat Capacity of Silicene Nanotube Compared to Silicene Nanoribbon, Silicon, 14 , 5617-5628, **2022**

26. **Chegel, Raad**; Behzad, Somayeh; Controlling the thermoelectric behaviors of biased silicene via the magnetic field: Tight binding model, Physica E: Low-dimensional Systems and Nanostructures, 135, 114945, **2022**

27. Aghaiimanesh, Ziba; **Chegel, Raad**; Ghobadi, Nader; Thermoelectric performance of biased silicene nanoribbon in the presence of magnetic field Micro and Nanostructures, 163, 107143, **2022**

28. **Chegel, Raad**; Tuning temperature-dependent of thermal conductivity and heat capacity of two-dimensional GeC compared to Graphene and Germanene: Effects of magnetic field, Physica B: Condensed Matter, 638, 413921, **2022**

29. **Chegel, Raad**; Behzad, Somayeh; Improvement of thermal conductivity in carbon doped BNNTs by electric field Journal of Molecular Graphics and Modelling, 116, 108259, **2022**

30. Behzad, Somayeh; **Chegel, Raad**; Investigation of Electronic Properties and Dielectric Response of Two-Dimensional Germanium Selenide with Puckered and Buckled Structures, Journal of Electronic Materials, 51, 6275-6285, **2022**

31. **Chegel, Raad**; Engineering the thermodynamic properties of Carbon doped Boron Nitride Nanotubes by impurity concentration and electric field, Chinese Journal of Physics, Accepted, **2022**

32. Behzad, Somayeh; **Chegel, Raad**; First principles study of biaxially deformed hexagonal buckled XS (X= Ge and Si) monolayers with light absorption in the visible region, Thin Solid Films, 759, 139457, **2022**

33. Ghiasi, Pouyan; **Chegel, Raad**; Ghobadi, Nader; Enhanced Electronic Thermal Conductivity and Heat Capacity of Biased Bilayer Boron Phosphide with Magnetic Field, Journal of Electronic Materials, 51, 7240-7256, **2022**

34. **Chegel, Raad**; Behzad, Somayeh; Wang, Ying; Xu, Jinrong; Controlling electrical and thermoelectric properties of bilayer SiC by bias voltage, Solid State Sciences, 121, 106737, **2021**

35. **Chegel, Raad**; Behzad, Somayeh; Tunable electronic, optical, and thermal properties of two-dimensional germanene via an external electric field, Scientific Reports, 10, 12, **2020**

36. Hasani, Mohammad; **Chegell, Raad**; Electronic and optical properties of the Graphene and Boron Nitride nanoribbons in presence of the electric field, Journal of optoelectronical nanostructures, 5, 49-64 **2020**

37. **Chegel, Raad**; Behzad, Somayeh; The effects of electric field on electronic and thermal properties of bilayer boron phosphide: Beyond nearest neighbor approximation, Synthetic Metals 266, 116476, **2020**

38. **Chegel, Raad**; Hasani, Mohammad; Electronic and thermal properties of silicene nanoribbons: Third nearest neighbor tight binding approximation, Chemical Physics Letters, 761, 138061, **2020**

39. Behzad, Somayeh; **Chegel, Raad**; First-principles study of the band structure and optical spectra of germanium carbide under mechanical strain, Journal of Electron Spectroscopy and Related Phenomena, 242, 146969, **2020**

40. Behzad, Somayeh; **Chegel, Raad**; Engineering thermal and electrical properties of B/N doped carbon nanotubes: Tight binding approximation, Journal of Alloys and Compounds, 792, 721-731, **2019**

41. **Chegel, Raad**; Behzad, Somayeh; Tight binding theory of thermal conductivity of doped carbon nanotube, Physica E: Low-dimensional Systems and Nanostructures, 114, 113586, **2019**

42. Hasani, Mohammad; **Chegel, Raad**; Effect of the Electric Field on the Electronic and Optical Properties of the Bilayer Graphene, Bilayer Boron Nitride and Graphene/Boron Nitride, Iranian Journal of Applied Physics, 9, 27-41, **2019**

43. حسنی; محمد; **چگل; رعد**; تأثیر میدان الکتریکی بر خواص الکترونی و اپتیکی گرافن‌دولایه، بورون‌نیترید دولایه و دولایهٔ گرافن/بورون‌نیترید، فیزیک کاربردی ایران، 9 ،27-41 **2019**

44. Behzad, S; **Chegel, R**; Investigation the Optical Properties and thermal conductivity of N-doped Carbon Nanotubes in the presence of Electric field, Iranian Journal of Physics Research, 18 577-586, **2019**

45. Darvishi Gilan, Mahdi; **Chegel, Raad**; BN-C hybrid nanoribbons as gas sensors Journal of Electronic Materials, 47, 1009-1021, **2018**

46. **Chegel, Raad**; Enhanced electrical conductivity in graphene and boron nitride nanoribbons in large electric fields Physica B: Condensed Matter, 531, 206-212, **2018**

47. Behzad, Somayeh; **Chegel, Raad**; Investigation of the electro-optical properties of graphene with BC3 substrate Journal of Research on Many-body Systems, 8, 21-27, **2018**

48. Gilan, Mahdi Darvishi; **Chegel, Raad**; Electronic and transport properties of BCN alloy nanoribbons Physica E: Low-dimensional Systems and Nanostructures, 97, 177-183, **2018**

49. Behzad, Somayeh; **Chegel, Raad**; Thermal conductivity, heat capacity and magnetic susceptibility of graphene and boron nitride nanoribbons, Diamond and Related Materials, 88, 101-109, **2018**

50. **Chegel, Raad**; Bias induced modulation of electrical and thermal conductivity and heat capacity of BN and BN/graphene bilayers, Physica B: Condensed Matter, 511, 26-35, **2017**

51. **Chegel, Raad**; Feyzi, Azra; Moradian, Rostam; Electrical and optical conductivities of bilayer silicene: Tight-binding calculations International Journal of Modern Physics B 31 1750158 **2017**

52. **Chegel, Raad**; Influence of bias on the electronic structure and electrical conductivity and heat capacity of graphene and boron nitride multilayers Synthetic Metals 223 172-183 **2017**

53. **Chegel, Raad**; Tight-binding description of the silicon carbide nanotubes, Journal of Alloys and Compounds, 695, 540-548, 2017

54. Behzad, Somayeh; **Chegel, Raad**; Magnetic field-induced splitting of optical spectra in silicon nanotubes: tight binding calculations Silicon, 8, 43-55, **2016**

55. Feyzi, Azra; **Chegel, Raad**; Heat capacity, electrical and thermal conductivity of silicene, The European Physical Journal B, 89, 193, **2016**

56. **Chegel, Raad**; Tuning electronic properties of carbon nanotubes by Boron and Nitrogen doping Physica B: Condensed Matter, 499, 16, **2016**

57. **Chegel, Raad**; Effects of carbon doping on the electronic properties of boron nitride nanotubes: Tight binding calculation, Physica E: Low-dimensional Systems and Nanostructures, 84, 223-234, **2016**

58. **Chegel, Raad**; Engineering the electronic structure and band gap of boron nitride nanoribbon via external electric field, Applied Physics A, 122, 8, **2016**

59. **Chegel, Raad**; Third-nearest-neighbors tight-binding description of optical response of carbon nanotubes: effects of chirality and diameter, Journal of Electronic Materials, 44, 3500-3511, **2015**

60. **Chegel, Raad**; Behzad, Somayeh; Electronic properties of SiNTs under external electric and magnetic fields using the tight-binding method, Journal of electronic materials, 43, 329-340, **2014**

61. **Chegel, Raad**; Behzad, Somayeh; Theoretical study of the influence of the electric field on the electronic properties of armchair boron nitride nanoribbon Physica E: Low-dimensional Systems and Nanostructures 64 158-164 **2014**

62. Behzad, Somayeh; **Chegel, Raad**; Moradian, Rostam; Shahrokhi, Masoud; Theoretical exploration of structural, electro-optical and magnetic properties of gallium-doped silicon carbide nanotubes Superlattices and Microstructures 73 185-192 **2014**

63. **Chegel, Raad**; Behzad, Somayeh; Chirality dependence of dipole matrix element of carbon nanotubes in axial magnetic field: A third neighbor tight binding approach, Optics Communications, 313, 406-415, **2014**

64. **Chegel, Raad**; Behzad, Somayeh; Optical absorption of zigzag single walled boron nitride nanotubes in axial magnetic field, Solid state sciences, 25, 70-77 **2013**

65. Behzad, Somayeh; **Chegel, Raad**; Investigation of magnetism in aluminum-doped silicon carbide nanotubes, Solid state communications, 174, 38-42, **2013**

66. **Chegel, Raad**; Behzad, Somayeh; Linear optical response of silicon nanotubes under axial magnetic field, Journal of electronic materials, 42, 58-70, **2013**

67. **Chegel, Raad**; Behzad, Somayeh; Band structure modulation for Si-h and Si-g nanotubes in a transverse electric field: Tight binding approach, Superlattices and Microstructures, 63, 79-90, **2013**

68. Behzad, Somayeh; Moradian, Rostam; **Chegel, Raad**; Structural and Electronic Properties of Silicon Carbide Nanotubes Journal of Computational and Theoretical Nanoscience 9 1860-1869 **2012**

69. **Chegel, Raad**; Behzad, Somayeh; Ahmadi, Eghbal; Effects of electric and magnetic fields on the electronic properties of zigzag carbon and boron nitride nanotubes Solid state sciences, 14, 456-464, **2012**

70. **Chegel, Raad**; Behzad, Somayeh; Electro-optical properties of zigzag and armchair boron nitride nanotubes under a transverse electric field: Tight binding calculations, Journal of Physics and Chemistry of Solids, 73, 154-161, **2012**

71. **Chegel, Raad**; Behzad, Somayeh; Effects of axial magnetic field on the electronic and optical properties of boron nitride nanotube, Physica E: Low-dimensional Systems and Nanostructures, 43, 1631-1637, **2011**

72. **Chegel, Raad**; Behzad, Somayeh; Effects of an electric field on the electronic and optical properties of zigzag boron nitride nanotubes, Solid state communications, 151, 259-263, **2011**

73. Moradian, Rostam; **Chegel, Raad**; Behzad, Somayeh; Linear optical response of carbon nanotubes under axial magnetic field, Physica E: Low-dimensional Systems and Nanostructures, 42, 1850-1860, **2010**

74. Behzad, Somayeh; Moradian, Rostam; **Chegel, Raad**; Structural and electronic properties of boron-doped double-walled silicon carbide nanotubes, Physics Letters A, 375, 174-179, **2010**

75. Moradian, Rostam; **Chegel, Raad**; Behzad, Somayeh; Optical absorption of zigzag single walled boron nitride nanotubes, Physica E: Low-dimensional Systems and Nanostructures, 43, 312-318, **2010**

76. Moradian, Rostam; Behzad, Somayeh; **Chegel, Raad**; Ab initio density functional theory investigation of structural and electronic properties of double-walled silicon carbide nanotubes, Physica E: Low-dimensional Systems and Nanostructures, 42, 172-175, **2009**

77. Moradian, Rostam; Behzad, Somayeh; **Chegel, Raad**; Ab initio density functional theory investigation of Li-intercalated silicon carbide nanotube bundles, Physics Letters A, 373, 2260-2266, **2009**

78. Moradian, Rostam; Behzad, Somayeh; **Chegel, Raad**; Ab initio density functional theory investigation of structural and electronic properties of silicon carbide nanotube bundles, Physica B: Condensed Matter, 403, 3623-3626, **2008**

79. Moradian, Rostam; Behzad, Somayeh; **Chegel, Raad**; Ab initio density functional theory investigation of crystalline bundles of polygonized single-walled silicon carbide nanotubes, Journal of Physics: Condensed Matter, 20, 465214, **2008**

Student Theses:

MSc. Photonics and Condensed Matter Physics:

1. **Anita Zhaleh Gouyan (Sep. 2012)**
   Title: Electromagnetic Wave Propagation in Single- and Multi-Walled Nanotubes Using the Hydrodynamic Model.
2. **Seyedeh Leila Salimi Dehkordi (Feb. 2013)**
   Title: Investigation of Microwave Propagation in Single-Walled Carbon Nanotubes.
3. **Farzaneh Danesh Mehr (Sep. 2013)**
   Title: Interaction of Charged Particles with Nanotubes and Analysis of Surface and Bulk Plasmons in Cylindrical Arrays Using the Hydrodynamic Model.
4. **Simin Heidari (Sep. 2013)**
   Title: Interaction of Charged Particles with Surface and Bulk Plasmons in Channels, Cylindrical Wires, and Nanotubes Using Classical and Quantum Models.
5. **Zohreh Kazemi (Sep. 2013)**
   Title: Electromagnetic Wave Propagation in Single-Walled Nanotubes Using Hydrodynamic and Quantum Models.
6. **Hamideh Amati (Sep. 2014)**
   Title: Electromagnetic Wave Propagation in Single- and Multi-Walled Boron Nitride Nanotubes Using Hydrodynamic and Tight-Binding Models.
7. **Fatemeh Joodaki (Jun. 2015)**
   Title: Electromagnetic Wave Scattering from Carbon Nanotubes.
8. **Fatemeh Touhidian (Oct. 2016)**
   Title: Investigation of Electrical and Conductivity Properties of Multilayer Graphene in the Presence of Impurities Using Tight-Binding Model and Kubo Formula.
9. **Majid Amini (Feb. 2016)**
   Title: Electrical Conductivity of Multilayer Boron Nitride in an Electric Field.

10. **Zahra Ashkavandi (Sep. 2017)**
    Title: Magnetic Susceptibility and Heat Capacity of Graphene-Boron Nitride Layers with Impurities.
11. **Alireza Pournagdi (Feb. 2019)**
    Title: Electrical and Optical Properties of Doped Carbon Nanotubes.
12. **Maryam Shams (Jul. 2019)**
    Title: Engineering Electro-Optical Properties of Single-Layer Black Phosphorene Using Density Functional Theory.
13. **Mahshid Nozarpour (Sep. 2019)**
    Title: Tuning the Optoelectronic Properties of Bi-Layer Graphene-Like Silicon Sheets.
14. **Farzaneh Bagher (Sep. 2020)**
    Title: Simulation of Total Plasmon-Polariton in Multilayer Photonic Waveguides Using Matrix Optics.
15. **Arman Heidari (Oct. 2022)**
    Title: Study of Multi-Layer Photonic Crystals in Dielectric-Superconductor-Metal Structures Using Matrix Optics.
16. **Soheila Dalvand (Oct. 2023)**
    Title: Effects of Defect States on the Properties of One-Dimensional Photonic Crystals.

PhD Theses:

Condensed Matter Physics:

1. **Azra Feyzi (Graduated Oct. 2016)**
   Title: Optical and Electrical Properties of Group IV Nanomaterials Using Tight-Binding Model.
2. **Mehdi Darvishi Gilan (Graduated Feb. 2018)**
   Title: Electronic Properties of Disordered Nanomaterials Based on Group IV Compounds.
3. **Mohammad Hassani (Graduated Feb. 2021)**
   Title: Electrical and Optical Properties of Nanoscale Group IV Compounds in an External Electric Field Using Density Functional Theory.
4. **Ziba Aghaei Manesh (Graduated May. 2022)**
   Title: Thermodynamic Properties of Silicene Nanoribbons and Nanotubes: Tight-Binding Model Based on Density Functional Theory.
5. **Mohammad Ghayathi (Co-Supervisor)**

Research Projects

1. **"Optical Properties of Zigzag Boron Nitride Nanotubes under Magnetic Fields"**
   Researchers: Raad Chegal, Somayeh Behzad
   Malayer University, Oct. 2011
2. **"Electrical Properties of Zigzag Boron Nitride Nanotubes under Electric and Magnetic Fields"**
   Researchers: Raad Chegal, Somayeh Behzad
   Malayer University, Jun. 2012
3. **"Electrical and Optical Behavior of Silicon Nanotubes Using the Tight-Binding Model"**
   Researchers: Raad Chegal, Somayeh Behzad
   Malayer University, Oct. 2013
4. **"Electrical and Optical Properties of Carbon Nanotubes under Magnetic Fields: Third-Neighbor Approximation"**
   Researchers: Raad Chegal, Somayeh Behzad
   Malayer University, Oct. 2015
5. **"Electrical Behavior of Boron Nitride Nanoribbons in External Fields Using the Tight-Binding Model"**
   Researcher: Raad Chegal
   Malayer University, Dec. 2016
6. **"Effects of Impurities on the Electrical Behavior of Silicon Carbide Nanotubes in External Fields Using the Tight-Binding Model"**
   Researcher: Raad Chegal
   Malayer University, Dec. 2019