



Contact Details:

Name: Mehdi Adelifard
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Mehdi Adelifard obtained his Ph.D. in solid state physics from Shahrood University of technology on September 2012, based on "An investigation on physical properties of thin films and nanostructures in chalcogenide compound semiconductors". Here, he was involved in the characterization of CuS, CuS-ZnS (CZS) binary and Cu₂SnS₃ (CTS) ternary semiconductors by means of XRD, FESEM, UV-Vis-NIR spectrophotometer, Hall effect setup and solar cell analyzer.

Mehdi Adelifard has authored or co-authored over 20 publications in national and international journals or conference proceedings.

Education:

- **2012, PhD.** in **solid state physics**, Shahrood University of technology, Iran (Thesis Supervisors: Prof. H. Eshghi and Associated Prof. M. M. Bagheri Mohagheghi)
- **2008, MS.** in **Solid State Physics**, Mashhad University of Iran
- **2005, B.S.** in **atomic physics**, Shiraz University of Iran

University positions:

January 2013 - Present **Assistant Professor**, School of physics, Damghan University, Damghan, Iran
May 2015 – Present **Head of Solid state physics group**, School of physics, Damghan University, Damghan

Teaching experience:

January 2013 – Present

Graduate courses: "Nanophysics and nanotechnology devices"

Undergraduate courses: "Fundamental Physics", "Optics & Wave", "Analytical Mechanics", " Geometric Optics"

Research Interests:

- **Synthesis and Characterization of nanostructures and semiconductor thin films**
- **Thin films and dye-synthesis Solar cells**

- Nano Electronics
- Spintronic
- Physics and chemistry of materials
- Magneto optical Properties of materials
- Thin films solar cell

Research Experience:

- **Design of Magneto optical Set up for Magneto optical faraday and kerr effects Measurements (MS Project) (2006-2009)**

Supervisor: Dr. Attaran Kakhki

In this project we prepared binary Mn- Co oxides thin layers by spray pyrolysis method. The films have been characterized by a special set up of hysteresis loop plotter containing a polarized He-Ne laser beam and a special electronic circuit. We plotted the hysteresis loop of thin films. Faraday and Kerr rotations were measured for these films by hysteresis loop plotter and their optical properties were also obtained by the use of software designed for this purpose according to Swane Poel theoretical method.

- **A Study in Doping and Annealing Effects On Structural, Electrical and Optical Properties in Transparent Conductor, SnO₂, Thin Films (Research project, Code:24025, This project has been supported by shahrood university of technology, Research Department, Shahrood, Iran) (March 2010)**

We have investigated the effect of fluorine dopant concentration (0–15 F/Sn wt.%) on structural, optical and electrical properties of SnO₂ thin films grown by spray pyrolysis technique. According to the experimental evidences and data analysis, we found in these samples: (1) the polycrystalline layers, while in undoped conditions it mainly grow along (211) direction in doped ones (200) is the preferred direction with a direct band gap energy of about 3.7–3.9 eV; (2) The main cause for the relatively high absorption coefficients below E_g could be due to the presence of wide (~1–2 eV) band tails in the forbidden gap; (3) the highest ($5.4 \times 10^{-3} \Omega^{-1}$) figure of merit belongs to the sample with 5 wt.% F/Sn concentration; (4) the grain boundary scattering is the main limiting mechanism in the electrical transport properties of the layers.

- **Experience in synthesis and characterization of different nano particles and nanostructured semiconductors (2006 till now, Ferdowsi Nanolab, Mashhad,Iran; Crystal growth lab, Shahrood, Damghan University, Damghan, Iran)**
- Deposition of nanostructure thin films such as Tin Oxide, Flourine Tin Oxide, Indium tin oxide, Zinc Oxide, Copper Sulfide, Copper Tin Sulfide and other sulfide layers by Spray pyrolysis technique and vacuum evaporation method
- Synthesis of SnO₂, ITO and ZnO nano particles by sol-gel and Hydrothermal methods
- Design of hetro-structure P-n junction on basis optimized binary and ternary chalcogenide absorber layers and electrical characterization of our devices

Professional & Scientific Membership:

- **Member of the editorial board** of Nanoscience and Nanoengineering Journal, Horizon Research Publishing, USA, August 2014-Present.
- **Iranian Physics Society**
- **Iranian Optics & Photonics Society**

SCIENTIFIC BACKGROUND

ISI Journal Papers:

- 1- **M. Adelifard**, 'Nanostructured $\text{Cu}_2\text{ZnSnS}_4$ thin Films: Influence of substrate temperature on structural, morphological, optical and electrical properties', Applied Physics A, **121** (2015) 95.
- 2- **M. Adelifard**, R. torkamani, 'Spray deposited $\text{Cu}_2\text{ZnSnS}_4$ nanostructured absorber layer: a promising candidate for solar cell applications', J Mater Sci: Mater Electron **26** (2015) 3700.
- 3- **M. Adelifard**, R. torkamani, 'Influence of growth temperature and silver to sulfur molar ratios on optical, electrical and thermoelectrical properties of nanostructured Ag_2S thin films', J Mater Sci: Mater Electron, **26** (2015) 7554.
- 4- **M. Adelifard**, M. M. Bagheri Mohagheghi, S. Namavar, 'Study of structural, morphological and optical properties of S and Cu co-doped SnO_2 nanostructured thin films prepared by spray pyrolysis', Int. J. Mater. Res. (formerly Z. Metallkd.) **105** (2014) 11.
- 5- **M. Adelifard**, M. M. Bagheri Mohagheghi, H. Eshghi, "Preparation and characterization of Cu_2SnS_3 ternary semiconductor nanostructures via spray pyrolysis technique for photovoltaic applications" (Phys. Scr. **85** (2012) 035603).
- 6- **M. Adelifard**, H.Eshghi, M.M.Bagheri Mohagheghi, " An investigation on substrate temperature and copper to sulphur molar ratios on optical and electrical properties of nanostructural CuS thin films prepared by spray pyrolysis method" (Applied Surface Science **258** (2012) 5733– 5738)
- 7- **M. Adelifard**, H.Eshghi, M.M.Bagheri Mohagheghi, "Synthesis and characterization of nanostructural CuS-ZnS binary compound thin films prepared by spray pyrolysis" (Optics communications, **285** (2012) 4400–4404)
- 8- **M. Adelifard**, H.Eshghi, M.M.Bagheri Mohagheghi, "Comparative Studies of spray pyrolysis deposited Copper Sulfide Nanostructural Thin Films on glass and FTO coated glass" (Bulletin of Material Science, **35** (2012) 739.
- 9- H. Eshghi, A. Biam, **M. Adelifard**, "An investigation on impurity and grain boundary effects on structural, optical and electrical properties of $\text{SnO}_2:\text{F}$ thin films deposited by spray pyrolysis" (Modern Physics Letters B, Vol.25, No. 17 (2011) 1473-1485)
- 10- E. Attaran Kakhki, **M. Adelifard**, "Magneto-optic properties and optical parameter of thin MnCo films", Iranian Journal of Physics Research, **9:2** (2009).

Symposium Proceedings:

- **M. Adelifard**, "CZTS absorbing layer prepared using spray pyrolysis technique: A potential candidate for photovoltaic applications, (12th Iranian annual Conference on Condensed Matter, 27-28 January 2014)

- Rohallah Torkamani, **M. Adelifard**, Mahdi Ardyanian, “Synthesis and characterization of Ag_8SnS_6 ternary compound semiconductors by spray pyrolysis technique (12th Iranian annual Conference on Condensed Matter, 27-28 January 2014)
- M. Azizi, M.R. Fadavi eslam, **M. Adelifard**, “Study on the annealing temperature effect on structural and optical properties of copper-aluminium oxide binary compound semiconductor prepared by spray pyrolysis technique” (12th Iranian annual Conference on Condensed Matter, 27-28 January 2014)
- M. Azizi, M.R. Fadavi eslam, **M. Adelifard**, “Study on the substrate temperature effect on structural and optical properties of nanostructured copper oxide thin films prepared by spray pyrolysis”, (Iranian annual conference physics, September 2014)
- Rohallah Torkamani, **M. Adelifard**, Mahdi Ardyanian, “The effect of substrate temperature and sulfur concentration on the structural, optical and morphological properties of nanostructured Ag_2S thin films prepared by spray pyrolysis” (Iranian annual conference physics, September 2014)
- **M. Adelifard**, Rohallah Torkamani, Mahdi Ardyanian, “The effect of silver and sulfur concentrations on the structural and optical properties of silver sulfide thin films deposited by spray pyrolysis method”, (1th Iranian Conference on Nanotechnology, May 2013)
- **M. Adelifard**, Hosein Eshghi, Mohamad Mehdi Bagheri Mohagheghi, “A study on the substrate temperature effect on optical and structural properties of copper sulphide thin films prepared by spray pyrolysis” (10th Iranian annual Conference on Condensed Matter, 27-28 January 2011)
- **M. Adelifard**, Hosein Eshghi, Mohamad Mehdi Bagheri Mohagheghi, “The effect of sulphur concentration on structural and optical properties of copper sulphide thin films deposited by spray pyrolysis” (17th Iranian Conference on Optics and Photonics, International Center for Science, High Technology & Environmental Sciences, 8-10 February 2011)
- **M. Adelifard**, Hosein Eshghi, Mohamad Mehdi Bagheri Mohagheghi, “Structural, optical and electrical properties of copper sulfide thin films deposited by spray pyrolysis on glass and FTO coated glass, a comparison”, (5th International Conference on Amorphous and Nanostructured Chalcogenides, Bucharest, June26-July1, 2011)
- Ebrahim Attaran Kakhki, Mehdi Adelifard, “Study of magneto – optical kerr effect in Mn-Co thin films” (2th Iranian conference of physics Research, Summer 2007)
- Ebrahim Attaran Kakhki, Mehdi Adelifard, Mohamad Mehdi Bagheri Mohagheghi, “Magneto – optical properties of Mn-Co thin films prepared by spray pyrolysis” (Iranian annual conference physics, Summer 2007)