

AMIR N. SHIRAZI, PH.D.

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BIOSKETCH

Dr. Amir Shirazi works as a Postdoctoral Fellow at the University of Rhode Island. Shirazi's research can be appropriately described as "the application of chemistry to problems in biology" through designing small and/or large molecules and characterizing them by using mass spectroscopy techniques. Specific areas currently under investigation include (1) Development of new drug delivery systems; (2) Development of new prodrugs and multifunctional anticancer agents; (3) Characterization of chemical compounds (large/small) by using different mass spectroscopy techniques; (4) Evaluation of anticancer activity of compounds by cell based assays. Shirazi has a strong background in chemistry and biology. He was able to design and characterize a large number of small/large molecules and use them in *in-vitro* assays. He is an author or coauthor of 26 peer-reviewed publications and 22 proceeding papers.

EDUCATION

Postdoctoral Fellow	Chapman University	2013
	University of Rhode Island	
Ph.D. (Pharmaceutical Sciences)	University of Rhode Island	2013
M. Sc. (Polymer/Organic Chemistry)	Shiraz University	2009
B. Sc. (Chemistry)	Shiraz University	2006

HIGHLIGHTS

- Developed new methods and catalysts in organic/ polymer/ medicinal chemistry
- Developed new drug delivery systems/ new formulation for drugs
- Developed new cell based assays in cancer therapy

RESEARCH EXPERIENCE

Department of Biomedical and Pharmaceutical Sciences, University of Rhode Island 2009 –2013

Graduate Research Assistant

Project: *Synthesis and characterization of self-assembled cyclic peptide nanoparticles / Lipo-peptides and their applications in drug delivery / New application of metal nanoparticles in drug delivery and formulations*

- Synthesized cyclic peptides / Lipo-peptides
- Purified peptides
- Characterized self-assembled peptide nanoparticles
- Investigated cellular uptake of nanoparticles
- Delivered negatively charged biomolecules including phosphopeptides, oligonucleotide, and genes using peptide nanoparticles as carriers
- Designed new prodrugs to enhance ADME properties
- Investigated the mechanism of binding peptides to drugs

- Investigated the binding of peptides to metals
- Worked on the encapsulation of drugs (eg. Pyrene, Camptothecin, and Nile Red)
- Performed anticancer assays using cultured cancer cells
- Performed mechanistic studies on anticancer drugs function including cell-cycle arrest, apoptosis, and efflux assays

Department of Chemistry, Shiraz University

2006–2009

Graduate Research Assistant

Project: *Preparation and new applications of novel solid phase reagents and catalysts in organic synthesis*

- Synthesized novel polymeric reagent as new functional polymers employing solid phase reactions
- Synthesized different polymer supported catalysts employing functionalization methods in polymer chemistry
- Designed functional polymers for various applications
- Characterized novel polymer supported moieties

Department of Chemistry, Shiraz University

2001–2006

Undergraduate Research Assistant

Project: *Discovery of new catalysts and their applications*

- Synthesized novel homogenous and heterogeneous catalysts
- Characterized new catalysts
- Developed the applications of new catalysts in different reactions
- Developed new microwave assisted methods in organic synthesis

KEYWORDS

- **Chemistry Methods:** Solid Phase, Microwave-Assisted, Solvent-free, One-pot multi-component reactions
- **Mass Spectrometry:** Matrix Assisted Laser Desorption Ionization (MALDI-MS), Electrospray Ionization (ESI-MS), Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
- **Purification:** High Pressure Column Chromatography (HPLC), Analytical HPLC, Dialysis Methods, Size Exclusion Chromatography, Silica Gel Column Chromatography
- **Flow Cytometry:** Fluorescence Activated Cell Sorter (FACS)
- **Microscope:** Wide Field Fluorescence Microscope, Confocal Microscope, Transmission Electron microscope (TEM), Scanning Electron microscope (SEM),
- **Others:** Isothermal Titration Calorimetry (ITC), Ultra violet spectrophotometer(UV), Infra Red (IR) Spectrometer, Glass Transition Temperature (T_g), X-ray Diffraction (XRD), nuclear magnetic resonance (NMR)

PROFESSIONAL MEMBERSHIP and AWARDS

- Member of the American Chemical Society, Present
- College of Pharmacy Foundation Award, University of Rhode Island, 2011
- College of Pharmacy Graduate Student Research Excellence Award, University of Rhode Island, 2012

- Graduate School Tuition Scholarship, University of Rhode Island, 2012
- College of Pharmacy Scholarship Endowment, University of Rhode Island, 2012
- A Member of an Organizing Committee of Frontiers in Pharmaceutical Sciences: Global Perspectives, International Meeting, University of Rhode Island, 2012
- The Prestigious **University of Rhode Island Graduate Student Research Excellence Award in Life Sciences, Physical Sciences and Engineering**, University of Rhode Island, 2013
(<http://www.uri.edu/news/releases/?id=6683>)

LIST of PUBLICATIONS: Available on Scifincer (scifinder.cas.org) and Google Scholar (scholar.google.com)

26. Narva Suresh, Hunsur Nagendra Nagesh, Anil Kumar, **Amir N. Shirazi**, Keykavous Parang, Kondapalli Venkata Gowri Chandra Sekhar (Synthesis of novel ciprofloxacin analogues and evaluation of their anti-proliferative effect on human cancer cell lines) *Bio & Med. Chem. Lett.*, **2013**, In Press, DOI: 10.1016/j.bmcl.2013.09.077
25. Dindyal Mandal, Rakesh K. Tiwari, **Amir Nasrolahi Shirazi**, Guofeng Ye, Antara Banerjee, Arpita Yadav, Keykavous Parang, (Self-Assembled Cyclic Peptides as Stabilizing and Surfactant Agents) *Soft Matter*, **2013**, 9, 9465.
24. Kasiviswanadharaju Pericherla, **Amir Nasrolahi Shirazi**, V. Kameshwara Rao, Rakesh Tiwari, Nicholas DaSilva, Kellen T. McCaffrey, Navindra Seeram, Keykavous Parang, Anil Kumar, (Synthesis and antiproliferative activities of quebecol and its analogs) *Bio & Med. Chem. Lett.* **2013**, 23, 5329.
23. **Amir Nasrolahi Shirazi**, Rakesh Kumar Tiwari, Donghoon Oh, Brian Sullivan, Kellen McCaffrey, Dindyal Mandal, Keykavous Parang, (Surface decorated gold nanoparticles by linear and cyclic peptides as molecular transporters) *Molecular Pharmaceutics*, **2013**, 10, 3137.
22. Karam Chand, Rakesh K Tiwari, Sumit Kumar, **Amir Nasrolahi Shirazi**, Sweta Sharma, Erik V Eycken, Virinder S Parmar, Keykavous Parang, Sunil K Sharma, (Synthesis, antiproliferative, and c-Src Kinase inhibitory activities of chromone derivatives) *J. Heterocyclic Chem.* **2013**, In Press, DOI: 10.1002/jhet
21. V. Kameshwara Rao, Rakesh Tiwari, Bhupender S. Chhikara, **Amir Nasrolahi Shirazi**, Keykavous Parang, Anil Kumar, (Copper(II) triflate-mediated synthesis of 1,3,5-triarylpyrazoles in [bmim] [PF₆] ionic liquid and evaluation of their anticancer activities) *RSC. Adv.*, **2013**, 3, 15396.
20. Kaveh P. Boroujeni, Irandokht Soltanian, **Amir Nasrolahi Shirazi**, (Synthesis and characterization of some new aromatic polytriazoles as proton conductive membranes) *Polymer Bulletin*, **2013**, 70, 2411.
19. Karam Chand, **Amir Nasrolahi Shirazi**, Preeti Yadav, Rakesh K. Tiwari, Meena Kumari, Keykavous Parang, Sunil K. Sharma, (Synthesis, antiproliferative and c-Src kinase inhibitory activities of cinnamoyl- and pyranochromen-2-one derivatives) *Can. J. Chem.*, **2013**, 91, 741.
18. **Amir Nasrolahi Shirazi**, Alex Brown, Rakesh Kumar Tiwari, Dindyal Mandal, Gongqin Sun, Keykavous Parang, (Cyclic peptides containing tryptophan and arginine as Src kinase inhibitors) *Bio & Med. Chem. Lett.*, **2013**, 23, 3230.
17. **Amir Nasrolahi Shirazi**, Rakesh Kumar Tiwari, Donghoon Oh, and Keykavous Parang, (Efficient delivery of cell impermeable phosphopeptides by a cyclic peptide amphiphile containing tryptophan and arginine) *Molecular Pharmaceutics*, **2013**, 10, 2008.
16. **Amir Nasrolahi Shirazi**, Rakesh Tiwari, Bhupender Chhikara, Dindyal Mandal, Keykavous Parang, (Design and biological evaluation of cell-penetrating peptide-doxorubicin conjugates as prodrugs) *Molecular Pharmaceutics*, **2013**, 10, 488.
15. **Amir Nasrolahi Shirazi**, Dindyal Mandal, Rakesh K. Tiwari, Liangran Guo, Wei Lu, Keykavous Parang, (Cyclic peptide-capped gold nanoparticles as drug delivery systems) *Molecular Pharmaceutics*, **2013**, 10, 500.

14. M. S. Rao, Bhupender Chhikara, Rakesh Tiwari, **Amir Nasrolahi Shirazi**, Keykavous Parang, A. Kumar, (A greener synthesis of 2-aminochromenes in ionic liquid and evaluation of their antiproliferative activities) *Chemistry & Biology Interface*, **2012**, 2, 362.
13. M. Sudershan Rao, Bhupender S. Chhikara, Rakesh Tiwari, **Amir N. Shirazi**, Keykavous Parang, Anil Kumar, (Microwave-assisted and scandium triflate catalyzed synthesis of tetrahydrobenzo[a]xanthen-11-ones) *Monatshefte fur Chemie*. **2012**, 143, 263.
12. Ali Rafinejad, Asal Fallah-Tafti, Rakesh Tiwari, **Amir Nasrolahi Shirazi**, Deendayal Mandal, Abbas Shafiee, Keykavous Parang, Alireza Foroumadi, Tahmineh Akbarzadeh (4-Aryl-4H-naphthopyrans derivatives: One-pot synthesis, evaluation of Src kinase inhibitory and anti-proliferative activities) *DARU Journal of Pharmaceutical Sciences*. **2012**, 20, 100.
11. V. Kameshwara Rao, Bhupender S. Chhikara, Rakesh Tiwari, **Amir Nasrolahi Shirazi**, Keykavous Parang, Anil Kumar, (One-pot regioselective synthesis of tetrahydroindazolones and evaluation of their anti-proliferative and Src kinase inhibitory activities) *Bio & Med. Chem. Lett.* **2012**, 22, 410.
10. Abha Kathuria, Sarah Jalal, Rakesh Tiwari, **Amir Nasrolahi Shirazi**, Shilpi Gupta, Shiv Kumar, Keykavous Parang, Sunil K. Sharma, (Substituted coumarin derivatives: Synthesis and evaluation of antiproliferative and Src kinase inhibitory activities) *Chemistry & Biology Interface*, **2011**, 1, 2, 279.
9. Deendayal Mandal, **Amir Nasrolahi Shirazi**, Keykavous Parang, (Cell-Penetrating Homochiral Cyclic Peptides as Nuclear-Targeting Molecular Transporters) *Angewandte Chemie, International Edition*, **2011**, 50(41), 9633.
8. Asal Fallah-Tafti, Alireza Foroumadi, Rakesh Tiwari, **Amir Nasrolahi Shirazi**, David G. Hangauer, Yahao Bu, Tahmineh Akbarzadeh, Keykavous Parang, Abbas Shafiee, (Thiazolyl *N*-Benzyl-Substituted Acetamide Derivatives: Synthesis, Src Kinase Inhibitory and Anticancer Activities) *Eur. J. Med. Chem.* **2011**, 46, 4853.
7. V. Kameshwara Rao, Bhupender S. Chhikara, **Amir Nasrolahi Shirazi**, Rakesh Tiwari, Keykavous Parang , Anil Kumar, (3-Substitued indoles: One-pot synthesis and evaluation of anticancer and Src kinase inhibitory activities) *Bio & Med. Chem. Lett.* **2011**, 21, 3511.
6. Asal Fallah-Tafti, Rakesh Tiwari, **Amir Nasrolahi Shirazi**, Tahmineh Akbarzadeh, Deendayal Mandal, Abbas Shafiee, Keykavous Parang, Alireza Foroumadi, (4-Aryl-4H-Chromene-3-Carbonitrile Derivatives: Evaluation of Src Kinase Inhibitory and Anticancer Activities) *Med. Chem.* **2011**, 7, 466.
5. Kaveh Parvanak Borujeni, **Amir Nasrolahi Shirazi**, (Silica gel and polystyrene supported aluminium chloride as heterogeneous catalysts for the preparation of α -aminophosphonates) *Heteroatom Chemistry*. **2010**, 21, 418.
4. Bahman Tamami, **Amir Nasrolahi Shirazi**, Kaveh Parvanak Borujeni, (Polystyrene supported aluminum chloride as an efficient and reusable catalyst for condensation of indole with various carbonyl compounds) *J. Serb. Chem. Soc*, **2010**, 75, 423.
3. Bahman Tamami, **Amir Nasrolahi Shirazi**, Farzaneh Ebrahimzadeh, (Synthesis and applications of cross-linked poly (*N*-bromomaleimide) in oxidation of various organic compounds) *Iran. Poly. J*, **2009**, 18, 957.
2. Ali Khalafi-Nezhad, Abolfath Parhami, Abdolkarim Zare, **Amir Nasrolahi Shirazi**, Ahmad Reza Moosavi Zare, Alireza Hassaninejad, (Triarylmethyl chlorides as novel, efficient, and mild organic catalysts for the synthesis of *N*-sulfonyl imines under neutral conditions) *Can. J. Chem.* **2008**, 86, 456.
1. Hasaninejad, A, Parhami, A, Zare, A, Khalafi-Nezhad, A, **Nasrolahi Shirazi, A**, Moosavi Zare, A. R. (Magnesium sulfate as an efficient and very cheap reagent for the reparation of bis(indolyl)methanes) *Polish J. Chem.* **2008**, 82, 565.

List of Submitted Papers:

- i. Somayeh Motavallizadeh, Asal Fallah-Tafti, Saeedeh Maleki, **Amir Nasrolahi Shirazi**, Mahboobeh Pordeli, Maliheh Safavi, Sussan Kabudanian Ardestani, Shaaban Asd, Rakesh Tiwari, Donghoon Oh, Abbas Shafiee, Alireza Foroumadi, Keykavous Parang, Tahmineh Akbarzadeh, (Synthesis and evaluation of cytotoxic activity of substituted *N*-(9-oxo-9*H*-xanthen-4-yl)benzenesulfonamides) *Med. Chem. Res.* **2013**.

- h. **Amir Nasrolahi Shirazi**, Kellen T. McCaffrey, Rakesh Kumar Tiwari, Keykavous Parang, (Peptide amphiphiles containing arginine and fatty acyl chains as molecular transporters) *Molecular Pharmaceutics*, **2013**.
- g. **Amir Nasrolahi Shirazi**, Brian Sullivan, Kellen McCaffrey, Donghoon Oh, Anil Kumar, Keykavous Parang, (Surface functionalized selenium nanoparticles *via* cyclic peptides as drug delivery systems) *Molecular Pharmaceutics*, **2013**.
- f. Naglaa Salem El-Sayed, **Amir Nasrolahi Shirazi**, Magda Goda El-Meligy, Ahmed Kamel El-Ziaty, Keykavous Parang, Zenat Adeeb Nagib (One-pot Multi-Component Microwave Assisted Synthesis of 4-Aryl-6-Indolylpyridine-3-Carbonitriles and Evaluation of their Antiproliferative Activity) *Bio & Med. Chem. Lett.*, **2013**.
- e. **Amir Nasrolahi Shirazi**, Yousef Ahmadibeni, Keykavous Parang, (Cyclic peptides reduce toxicity of heavy metals) *Metallomics*, **2013**.
- d. Dindyal Mandal, **Amir Nasrolahi Shirazi**, and Keykavous Parang (Self-assembly of peptides towards the formation of nanostructures and their potential applications) *Org. Bio. Chem*, Review Article, **2013**.
- c. **Amir Nasrolahi Shirazi**, Karissa Neira, Nial Howlett, Keykavous Parang, (Cyclic peptide-capped gold nanoparticles for enhanced siRNA delivery) *Bio & Med. Chem. Lett.*, **2013**
- b. Raju Suresh Kumar, Farzana Beevi, **Amir Nasrolahi Shirazi**, Hasnah Osman, Rusli Ismail, Tan Soo Choon, Brian Sullivan, Kellen McCaffrey, Alaa Nahhas, Keykavous Parang, Mohamed Ashraf Ali. (A Facile, Regio- and Diastereoselective Synthesis of Spiro-Pyrrolidine and Pyrrolizine Derivatives and Evaluation of Their Antiproliferative Activities). *Eur. J. Med. Chem.* **2011**, 46, 4853.
- a. Sunil Sharma, Karam Chand, Suchita Prasad, Rakesh K Tiwari, Amir N Shirazi, Sumit Kumar, Keykavous Parang, (Synthesis and Evaluation of c-Src Kinase Inhibitory Activity of Pyridin-2(1H)-one Derivatives) *Bioorganic Chemistry*, **2013**.

CONFERENCE / MEETING PRESENTATIONS

22. **Nasrolahi Shirazi, A.**, Parang, K. Cyclic peptide-capped selenium nanoparticles as molecular transporters. 246th *ACS National Meeting & Exposition*, Indianapolis, IN, United States, September 8-12, **2013**, BIOL-20922.
21. **Nasrolahi Shirazi, A.**, Neira, K.; Mandal, D.; Howlett, N.; Parang, K. Cyclic peptide-capped gold nanoparticles for enhanced siRNA delivery. 245th *ACS National Meeting & Exposition*, New Orleans, LA, United States, April 7-12, **2013**, MEDI-352.
20. **Nasrolahi Shirazi, A.**, Tiwari, R.; Chhikara, B. S.; Mandal, D.; Parang, K. Peptide amphiphiles as new transporters for the delivery of phosphopeptides. 245th *ACS National Meeting & Exposition*, New Orleans, LA, United States, April 7-12, **2013**, MEDI-118.
19. **Nasrolahi Shirazi, A.**, Mandal, D., Tiwari, R., Neira, K., Howlett, N., Parang, K. Synthesis of a new generation of cyclic peptides and their applications in biomedical sciences. *The Institute for Molecular and Nanoscale Innovation (IMNI)*, Brown University, November 9, **2012**.
18. **Nasrolahi Shirazi, A.**, Parang, K. Amphiphilic cyclic peptide-selenium nanoparticles: Synthesis and antiproliferative activity. *1st International Conference on Frontiers in Pharmaceutical Sciences: Global Perspectives*, Kingston, RI, Sept. 28-30, **2012**, C26.
17. Tiwari, R. K., Brown, A.; **Nasrolahi Shirazi, A.**, Sun, G., Parang, K. Dasatinib-fatty acid conjugates: Synthesis and evaluation of tyrosine kinase inhibitory and anticancer activities. *244th ACS National Meeting & Exposition*, Philadelphia, PA, United States, August 19-23, **2012**, MEDI-326.
16. Tiwari, R. K.; Brown, A.; **Shirazi, A. N.**; Sun, G.; Parang, K. Synthesis and evaluation of dasatinib amino acid derivatives for their anticancer and protein tyrosine kinase activity. *244th ACS National Meeting & Exposition*, Philadelphia, PA, United States, August 19-23, **2012**, MEDI-254.
15. **Nasrolahi Shirazi, A.**; Tiwari, R; Mandal, D; Parang, K. Enhanced drug delivery by linear and cyclic peptides containing tryptophan and lysine through capping of gold nanoparticles. *63rd Southeast Regional Meeting of the American Chemical Society*, Richmond, VA, United States, October 26-29,

2011, SERM-23.

14. Parang, K., Mandal, D., **Nasrolahi Shirazi, A.** Gold nanoparticle-capped peptides: Design, characterization, and application in drug delivery. *RI Nanotechnology Showcase*, Providence, RI, April 7, **2011**.
13. **Nasrolahi Shirazi, A.**, Tiwari, R.; Chhikara, B. S.; Mandal, D.; Parang, K. Synthesis and evaluation of cell-penetrating peptide-doxorubicin conjugates. *244th ACS National Meeting & Exposition*, Philadelphia, PA, United States, August 19-23, **2012**, MEDI-66.
12. **Nasrolahi Shirazi, A. N.**, Tiwari, R., Mandal, D., Parang, K. Cyclic and linear homochiral decapeptides containing tryptophan and arginine/lysine residues as Src kinase inhibitors. *43rd Middle Atlantic Regional Meeting of the American Chemical Society*, Baltimore, MD, United States, May 31-June 2, **2012**, MARM-341.
10. **Nasrolahi Shirazi, A.**, Tiwari, R., Oh, D., Ye, G., Parang, K. Amphiphilic cyclic peptide [WR]4 as an efficient transporter of negatively charged phosphopeptides. *43rd Middle Atlantic Regional Meeting of the American Chemical Society*, Baltimore, MD, United States, May 31-June 2, **2012**, MARM-343.
9. **Nasrolahi Shirazi, A.**, Kaveh Parvanak Boroujeni, Polystyrene supported AlCl₃ as a highly chemoselective catalyst for Fries rearrangement of aryl esters, *43rd ACS Middle Atlantic Regional Meeting (MARM 2012)*, Baltimore, Maryland, **2012**.
8. **Nasrolahi Shirazi, A.**; Mandal, D.; Tiwari, R.; Parang, K. Peptide-capped Gold Nanoparticles: Design, Characterization, and Their Application in Drug Delivery, *42nd Middle Atlantic Regional Meeting of the American Chemical Society, College Park, MD, United States*, May 21-24, **2011**, MARM-221.
7. Parang K., Mandal, D., **Nasrolahi Shirazi, A.**, Cell-penetrating homochiral peptides as nuclear targeting molecular transporters. *Nature Chemical Biology Symposium*, Cambridge, MA, Oct 20-22, **2011**.
6. Yousef Ahmadibeni, **Amir Nasrolahi Shirazi**, Keykavous Parang, Metal-binding properties of cyclic peptides, *43rd IUPAC World Chemistry Congress*, San Juan, PR, United States, **2011**.
5. **Nasrolahi Shirazi, A.**, Gupta, A.; Parang, K., Bothun, G. Self-Assembled Peptide-Amphiphile/Lipid Mixtures, *Nanoscale Science and Engineering forum session (AIChE Meeting)*. Salt Lake City, Utah, **2010**.
4. **Nasrolahi Shirazi, A.**, Parang, K.; Tamami, B. Polystyrene supported aluminum chloride as an efficient and reusable catalyst for synthesis of α -aminophosphonates *via* one-pot three component coupling reaction of aldehydes, amines, and diethylphosphite, *240th ACS National Meeting & Exposition*, Boston, MA, **2010**.
3. **Nasrolahi Shirazi, A.**, Tamami, B. Synthesis and applications of crosslinked poly(*N*-bromomaleimide) in oxidation of various organic compounds, *9th International Seminar on Polymer Science & Technology (ISPST 2009)*, Tehran, Iran, **2009**.
2. Parhami, A.; Khalafi-Nezhad, A.; **Nasrolahi Shirazi, A.** Triarylmethyl chlorides as novel and efficient organic catalysts for *knoevenagel* condensation under mild conditions, *42nd IUPAC Congress (Chemistry Solutions)*, Glasgow, UK, **2009**.
1. **Nasrolahi Shirazi, A.**, Tamami, B. Polystyrene supported aluminum chloride as an efficient and reusable catalyst for condensation of indole with various carbonyl compounds. *International Catalysis Conference (ICC 2008)*, Tehran, Iran, **2008**.

FUNDED GRANT PROPOSALS

1. **"SELF-ASSEMBLED PEPTIDE NANOSTRUCTURES AS MOLECULAR TRANSPORTERS"**, Enhancement Graduate Research Award (EGRA), Graduate School, University of Rhode Island, \$1000 June 2011 for travel and equipment purchase.
2. **"CYCLIC PEPTIDE-CAPPED GOLD NANOPARTICLES AS DOUBLE-BARRELLED DRUG DELIVERY SYSTEMS"**, Enhancement Graduate Research Award (EGRA), Graduate School, University of Rhode Island, \$1000 June 2012 for travel and equipment purchase.

3. "AMPHIPHILIC CYCLIC PEPTIDE as NEW NUCLEAR TARGETING TRANSPORTING TOOL TOWARDS GENE THERAPY", Enhancement Graduate Research Award (EGRA), Graduate School, University of Rhode Island, \$1000 June 2013 for travel and equipment purchase.