# Davit Jishkariani

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**Professional experience**

- **Associate Technical Director**, Chemical and Nanoparticle Synthesis Core (CNSC), University of Pennsylvania, **2018-present**
- **Post-Doctoral Fellow**, University of Pennsylvania, (Prof. Christopher B. Murray) **2014-2017**
- **Visiting Scholar**, University of Pennsylvania, (Prof. Virgil Percec) **2013-2014**

**Education**

- **Ph.D. in Organic Chemistry**, University of Florida (Prof. Alan R. Katritzky) **2012**
- **M.Sc. in Chemistry**, Iv. Javakhishvili Tbilisi State University, **2007**
- **B.Sc. in Chemistry**, Iv. Javakhishvili Tbilisi State University, **2005**

**Research Interests**

- Soft nanomaterials
- Design, synthesis, self-assembly, and application of dendritic and polymeric macromolecules.
- Dendrimer, polymer, and nanoparticle-based hybrid systems for drug delivery and imaging.
- Nanoparticle synthesis and self-assembly.
- Multifunctional amphiphilic (Janus) nanomaterials.

**Professional Service**

- Journal Crystals Topics Editor (**2019-Present**)
- Journal of Turkish Chemical Society, Section A: Chemistry (JOTSA) Editorial Advisory Board Member (**2016-Present**)

## Awards, Diplomas, and Honors

- Invited speaker on 5th Organic Chemistry Congress 2020 with International Participation, **2020**.
- Mack (University of Pennsylvania) fellow, **2018**
- Best poster award at the Materials Research Society (MRS) Fall meeting, **2017**
- Best poster award at FloHet-13 conference, **2012**
- W. M. Jones Award for Research Originality and Creativity, **2011**
- Procter & Gamble Award for Research Excellence, **2011**
- Diploma at Tbilisi State University student's 67th Scientific Conference, **2007**
- Diploma at Tbilisi International Conference “Advanced Materials and Technologies”, **2006**
- “Open Society Georgia Foundation” Scholarship, **2004**
- Diploma at “Soros International Educational Programs” Conference, **2004**
- Diploma at Tbilisi State University student's 64th Scientific Conference, **2004**
- Diploma at Tbilisi State University student's 63rd Scientific Conference, **2003**
- Tbilisi State University Stipend for Excellent Grades, **2003-2005**

## Publications

22. Zhao, T.; Oh, N.; **Jishkariani, D.**; Zhang, M.; Wang, H.; Li, N.; Lee, J. D.; Zeng, C.; Muduli, M.; Choi, H-J.; Su, D.; Murray. C. B.; Kagan, C. R. General Synthetic Route to High-Quality Colloidal III–V Semiconductor Quantum Dots Based on Pnictogen Chlorides, *J. Am. Chem. Soc.* **2019,** *141*, 15145.
    - **Highlighted** on www.nanomanufacturing.eng.cam.ac.uk

21. **Jishkariani, D.**; Elbert, K. C.; Wu, Y.; Lee. J. D.; Hermes, M.; Wang, D.; Blaaderen, A. V.; Murray, C. B. Nanocrystal Core Size and Shape Substitutional Doping and Underlying Crystalline Order in Nanocrystal Superlattices *ACS Nano,* **2019**, *13*, 5712.
    - **Highlighted** on twitter @acsnano
20. Lee. J. D.; **Jishkariani, D.**; Yingrui, z.; Najmr. S.; Rosen, D.; Kikkawa, J.; Stach, E. Murray, C. B. Tuning the Electrocatalytic Oxygen Reduction Reaction Activity of PtCo Nanocrystals by Cobalt Concentration with Atomic-Scale Understanding, *ACS Applied Materials & Interfaces*, **2019**, *11*, 26789.
    - **Highlighted** by Penn Today
    - **Highlighted** by Phys.org
    - **Highlighted** by The Daily Pennsylvanian
    - **Highlighted** by www.thefourpointplay.blog
    - **Highlighted** by US Department of Energy office of Scientific and Technical Information
    - **Highlighted** by www.worldenergytrade.com
    - **Highlighted** by www.sohu.com
    - **Highligtted** by genesisnanotech.com
19. Zhang, M.; Guo, J.; Yu, Y.; Wu, Y.; Yun, H.; **Jishkariani, D.**; Chen, W.; Greybush, N. J.; Kübel, C.; Stein, A.; Murray, C. B.; Kagan, C. R. Three-dimensional nanofabrication via chemo-mechanical transformation of nanocrystal/bulk hetero-structures, *Adv. Mater*. **2018**, *30*, 1800233.
18. **Jishkariani, D.**; MacDermaid, C. M.; Timsina, Y. N.; Grama, S.; Gillani, S. S.; Divar, M.; Yadavali, S. S.; Moussodia, R-O.; Leonawarat, P.; Berrios Camacho, A. M.; Walter, R.; Goulian, M.; Klein, M. L.; Percec, V. Self-interrupted Synthesis of Sterically Hindered Aliphatic Polyamide Dendrimers *Proc. Nat. Acad. Sci.* **2017**, *114*, E2275.
    - **Highlighted** by Penn Today
    - **Highlighted** by sciencedaily.com
17. **Jishkariani, D.**; Wu, Y.; Wang, D.; Liu, Y.; Blaaderen, A. V.; Murray, C. B. Preparation and Self-Assembly of Dendronized Janus Heterodimers *ACS Nano,* **2017***, 11,* 7958.
16. Elbert, K. C.; **Jishkariani, D.**; Wu, Y.; Lee, J. D.; Donnio, B.; Murray, C. B. Self-Assembly, and Switchable Wettability in Hydrophobic, Hydrophilic, and Janus Dendritic Ligand-Gold Nanoparticle Hybrid Materials *Chemistry of Materials*, **2017**, *29*, 8737.
    - Most downloaded article of the month.
15. **Jishkariani, D.**; Lee, J. D.; Yun, H.; Paik, T.; Kikkawa, J. M.; Kagan, C. R.; Donnio, B.; Murray, C. B. Dendritic effect and Magnetic Permeability in Dendronized Magnetic Nanoparticles *Nanoscale,* **2017**, *9*, 13922-13928.
14. Najmr, S.; **Jishkariani, D.**; Elbert, K. C.; Donnio, B.; Murray, C. B. A Semi-combinatorial Approach for Investigating the Polycatenar Ligand-controlled Synthesis of Rare-earth Nanocrystals. *Nanoscal,e* **2017***, 9,* 8107*.*
    - **Highlighted** by chemweb.com
13. Diroll, B. T.;* **Jishkariani, D.**;* Cargnello, M.; Murray, C. B.; Donnio, B. Polycatenar Ligand Control of the Synthesis and Self-Assembly of Colloidal Nanocrystals *J. Am. Chem. Soc*. **2016**, 10508. (***equal contribution**)
12. Malassis, L.; **Jishkariani, D.**; Murray, C. B.; Donnio, B. Dendronization-induced phase-transfer, stabilization and self-assembly of large colloidal Au nanoparticles *Nanoscale*, **2016**, *8*, 13192.
11. Chowdhury, L.; Croft, C.; Goel, S.; Zaman, N.; Tai, A.; Walch, E. M.; Smith, K.; Page, A.; Shea, K.; Hall, C. D.; **Jishkariani, D.;** Pillai, G.; Hall, A. C.; Differential Potency of 2, 6 Dimethylcyclohexanol Isomers for Positive Modulation of GABAA Receptor Currents *J. Pharm. Exp. Ther.* **2016**, *357*, 570
10. **Jishkariani, D.**; Diroll, B. T.; Cargnello, M.; Klein, D. R.; Hough, L. A.; Murray, C. B.; Donnio, B. Dendron-Mediated Engineering of Interparticle Separation and Self-Assembly in Dendronized Gold Nanoparticles Superlattices. *J. Am. Chem. Soc.* **2015***, 137,* 10728*.*

9. Diroll, B. T.; Weigandt K. M.; **Jishkariani, D.**; Cargnello, M.; Murphy R. J.; Hough, L. A.; Murray, C. B.; Donnio, B. Quantifying "Softness" of Organic Coatings on Gold Nanoparticles using Correlated Small-Angle X-Ray and Neutron Scattering. *Nano Lett,* **2015***, 15,* 8008.
8. Panmand, D.; **Jishkariani, D.**; Hall, C. D.; Steel,P. J.; Asiri, A. M.; Katritzky, A. R. Synthesis and Direct C2 Functionalization of Imidazolium and 1,2,4-Triazolium *N*-imides. *J. Org. Chem.* **2014**, *79*, 10593.
    - **Highlighed** in Cheminform Abstract. *DOI:10.1002/chin.201515170*
7. Wang, Z.; **Jishkariani, D.**; Killian, B. J.; Ghiviriga, I.; Hall, C. D.; Steel, P. J.; Katritzky, A. R. Synthesis of Heterocyclic Ylids as Candidates for Energetic Materials. *J. Energ. Mater.* **2014**, 32, 227.
6. **Jishkariani, D.**; Hall, C. D.; Tomlin, B.; Steel, P. J.; Katritzky, A. R. Push-pull Triazenes Derived from 1-(Benzylideneamino)- and 1-(Sulfonimido)-azolylidenes. *J. Org. Chem.* **2013**, *78*, 3349.
5. **Jishkariani, D.**; Hall, C. D.; Oliferenko, A.; Tomlin, B.; Steel, P. J.; Katritzky, A. R. Thermal fragmentation of spirodithiohydantoins: A novel route to NHCs. *RSC Advances,* **2013**, *3*, 1669.
4. **Jishkariani, D.**; Hall, C. D.; Katritzky, A. R. (US NAVY internal publication). *Energetic Materials Program* **2012**, *4,* 1.
3. **Jishkariani, D.**; Hall, C. D.; Oliferenko, A.; Leino. D.; Katritzky, A. R. Cu (I) catalyzed regioselective synthesis of pyrazolo[5,1-*c*]-1,2,4-triazoles. *J. Org. Chem.* **2012***, 77,* 5813.
    - **Highlighed** in Cheminform Abstract *DOI: 10.1002/chin.201244126.*
2. Katritzky, A. R.; **Jishkariani, D.**; Sakhuja, R.; Hall, C. D.; Steel, P. J. Carbene mediated transformations of 1-(Benzylideneamino)benzimidazoles. *J. Org. Chem.* **2011**, *76*, 4082.
    - **Highlighed** in Cheminform Abstract *DOI: 10.1002/chin.201134120.*
1. Katritzky, A. R.; **Jishkariani, D.**; Narindoshvili, T. Convenient synthesis of ibuprofen and naproxen aminoacyl, dipeptidoyl and ester derivatives. *Chem. Biol. Drug Des.* **2009**, *73*, 618.

## Patents

- Donnio, B.; **Jishkariani, D.**; Diroll, B. T.; Hough, L. A.; Murray, C. B.; Cargnello, M; Malassis, L. Hybrid Nanoparticles Containing Dendrons, Methods of Producing Such Hybrid Nanoparticles, and Uses Thereof. **Patent**: US20180162726A1, **Status**: **Granted** (propriety date: 06/12/2015)
- **Jishkariani, D.**; Wu, Y.; Murray, C. B. Dendrons for the Functionalization of Heterodimers and Hybrid Nanoparticles Formed Therefrom **Patent application**: US 62/440,578.
- **Jishkariani, D.**; Yun, H.; Lee, J. D.; Paik, T.; Kikkawa, J. M.; Kagan, C. R.; Donnio, B.; Murray, C. B. Dendrons for Tuning the Magnetic Properties of Nanoparticles and Hybrid Nanoparticles Formed Therefrom. **Patent application**: RD 2016/001-PSP2.
- Diroll, B. T.; **Jishkariani, D.**; Cargnello, M.; Murray, C. B.; Donnio, B. Polycatenar Ligands and Hybrid Nanoparticles Made Therefrom. **Patent application:** US 62/310047.
- Elbert, K. C.; **Jishkariani, D.**; Wu, Y.; Lee, J. D.; Donnio, B.; Murray, C. B. Dendritic Ligands for Controlling Self Assembly and Surface Polarity of Nanoparticles, And Hybrid Nanoparticles Produced Therefrom. **Patent application**: US 62/440,594.

## Presentations

- **Jishkariani, D.** Dendronization Enabled Self-Assembly and Tuning of Optical, Magnetic and Colloidal Properties of Nanoparticles, 252nd American Chemical Society National Meeting & Exposition, August 21-25, Philadelphia, PA, U.S.A. **2016**. (**Talk**)
- **Jishkariani, D.** Polycatenar Ligand Control of the Synthesis and Self-Assembly of Colloidal Nanocrystals, 252nd American Chemical Society National Meeting & Exposition, August 21-25, Philadelphia, PA, U.S.A. **2016**. (**Talk**)
- **Jishkariani, D.** Tuning of Optical, Magnetic and Colloidal Properties of Nanoparticles by Dendritic Ligands, 44th Middle Atlantic Regional Meeting (MARM 2016), June 9–12, College of Mount Saint Vincent, Riverdale, NY, U.S.A. **2016**. (**Talk**)

- **Jishkariani, D.** Tuning of Optical, Magnetic and Colloidal Properties of Nanoparticles with Dendritic ligands, Mid-Atlantic Seaboard Inorganic Symposium (MASIS), July 20, Philadelphia, PA, U.S.A. **2016**. (**Talk**)
- Elbert, K.; **Jishkariani, D.;** Donnio, B.; Murray, C. B. Self-Assembly of Janus Dendritic Ligands on Nanocrystal Surface, 252nd American Chemical Society National Meeting & Exposition, August 21-25, Philadelphia, PA, U.S.A. **2016**.
- Timsina, Y.; **Jishkariani, D.**; Grama, S.; MacDermaid, C. M.; Gillani, S.; Divar, M.; Moussodia, R.-O.; Leowanawat, P.; Berrios C., Angely M.; Klein, M. L. Percec, V. Divergent synthesis of four generations of aliphatic polyamide dendrimers, 252nd American Chemical Society National Meeting & Exposition, August 21-25, Philadelphia, PA, U.S.A. **2016**.
- Grama, S.; Timsina, Y.; **Jishkariani, D.**; MacDermaid, C. M.; Gillani, S.; Divar, M.; Moussodia, R.-O.; Leowanawat, P.; Berrios C., Angely M.; Klein, M. L. Percec, V. Divergent-convergent strategy for the synthesis of aliphatic polyamide dendrimers, 252nd American Chemical Society National Meeting & Exposition, August 21-25, Philadelphia, PA, U.S.A. **2016**.
- Murray, C. B.; Diroll, B.; Gaulding, E.; Wu, Y.; Chen, W.; Goodwin, E.; Oh, S.-J.; Cargnello, M.; Paik, T.; Kagan, C.; **Jishkariani, D.**; Donnio, B. Designing of optical and electronic materials on the mesoscale through nanocrystal assembly, 252nd American Chemical Society National Meeting & Exposition, August 21-25, Philadelphia, PA, U.S.A. **2016**. (**Talk**)
- **Jishkariani, D.** Dendrimer Mediated Synthesis and Self-Assembly of Colloidal Nanoparticles, 2015 MRS Fall Meeting & Exhibit, November 29 - December 4, Boston, MA, U.S.A. **2015**. (**Talk**)
- **Jishkariani, D.** "Dendron-Mediated Engineering of Interparticle Separation and Self-Assembly in Dendronized Gold Nanoparticles Superlattices", 44$^{th}$ National Organic Chemistry Symposium, June 28-July 2, College Park, MD. U.S.A. **2015**.
- **Jishkariani, D.** "Novel energy-rich linear triazenes, nitrogen ylids and heterocyclic N-oxides", US Navy Peer Review, August 7-10, Arlington, VA, U.S.A. **2012**. (**Talk**)
- **Jishkariani, D.** "Novel synthetic applications of *N*-amino heterocycles", 88$^{th}$ Annual Florida Annual Meeting and Exposition, May 17-20, Tampa, FL, U.S.A. **2012**. (**Talk**)
- **Jishkariani, D.**; Hall, C. D.; Oliferenko, A.; Leino, D. "Cu (I) mediated novel, regioselective synthesis of pyrazolo[5,1-*c*]-1,2,4-triazoles", 13$^{th}$ Annual Florida Heterocyclic and Synthetic Conference, March 4-7, Gainesville, Florida, U.S.A. **2012**. (**Best poster award**)
- **Jishkariani, D.**; Hall, C. D.; Tomlin, B. "Unexpected reversible dissociation reactions of spirodithiohydantoins", 13$^{th}$ Annual Florida Heterocyclic and Synthetic Conference, March 4-7, Gainesville, Florida, U.S.A. **2012**.
- **Jishkariani, D.**; Hall, C. D. "Search for novel heterocyclic polymers and high-density energetic materials", US Navy Peer Review, September 13-15, National Harbor, Washington DC, **2011**. (**Talk**)
- **Jishkariani, D.**; Chahar, M.; Hall, C. D. "Cu (I) catalyzed synthesis of pyrazolo-1,2,4-triazoles", 242th ACS National Meeting, August 28-September 1, Denver, CO, U.S.A. **2011**.
- **Jishkariani, D.**; Sakhuja, R.; Hall, C. D.; Steel, P. J. "NHC mediated transformations of benzylideneaminobenzimidazols", 87$^{th}$ Annual Florida Annual Meeting and Exposition, May 13-16, Tampa, FL, U.S.A. **2011**.
- **Jishkariani, D.**; Sakhuja, R.; Hall, C. D.; Steel, P. J. "Carbene mediated transformations of 1-(benzylideneamino) benzimidazoles", 12$^{th}$ Annual Florida Heterocyclic and Synthetic Conference, March 6-9, Gainesville, Florida, U.S.A. **2011**.
- **Jishkariani, D.**; Sakhuja, R. "Efficient synthesis of different benzimidazole derivatives as potential energetic materials", 86$^{th}$ Annual Florida Annual Meeting and Exposition, May 13-16, Tampa, FL, U.S.A. **2010**.
- **Jishkariani, D.**; Sakhuja, R. "Efficient synthesis of different 1-aminobenzimidazole derivatives", 11th Annual Florida Heterocyclic and Synthetic Conference, March 7-10, Gainesville, Florida, U.S.A. **2010**.
- **Jishkariani, D.**; Narindoshvili, T. "Convenient synthesis of ibuprofen and naproxen aminoacyl, dipeptidoyl and ester derivatives", 238th ACS National Meeting, August 16-20, Washington, DC, U.S.A. **2009**.

- **Jishkariani, D.**; Narindoshvili, T. “Convenient synthesis of ibuprofen and naproxen aminoacyl, dipeptidoyl and ester derivatives”, 10th Annual Florida Heterocyclic and Synthetic Conference, March 8-11, Gainesville, Florida, U.S.A. **2009**.
- **Jishkariani, D.**; Chankvetadze, L.; Chankvetadze, B. “Comparative enantioseparations with monolithic capillary columns based on cellulose tris (3,5 dimethylphenylcarbamate) in capillary liquid chromatography and capillary electrochromatography”, Advanced Materials and Technologies, May 10-11, Tbilisi, Georgia **2006**. (**Talk**)
- Chankvetadze, B.; **Jishkariani, D.**; Chankvetadze, L.; Yamamoto, C.; Kanigaito, M. “Application of monolithic chiral stationary phases for enantioseparations in capillary chromatography and elechtrochromatography”, Chirality 2006 - The 18th International Symposium on Chirality, June 25-28, Busan, Korea **2006**. (**Talk**)
- Chankvetadze, B.; **Jishkariani, D.**; Chankvetadze, L.; Tanaka, N. “Application of monolithic chiral stationary phases for enantioseparations in capillary chromatography and electro-chromatography”, 15th International Symposium on Capillary Electroseparation Techniques, August 28-30, Paris, France **2006**. (**Talk**)