

ANDY NIETO

ORAU Postdoctoral Fellow

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Research Summary

Dr. Nieto is currently an ORAU postdoctoral fellow at the multi-disciplinary vehicle technology directorate (VTD) at the US Army Research Laboratory. Current research focuses on advanced characterization of propulsion materials and materials solutions to challenges within turbomachinery applications and sciences. Materials systems of interest include advanced 'sandphobic' thermal barrier coatings, MAX phases, ceramic matrix composites, and ultra high temperature ceramics. Promising materials are evaluated in an atmospheric ingestion burner rig in order to investigate material response under relevant combustion and saden-laden environments. Characterization includes development of non-destructive analysis of components, and material damage and resistance to CMAS (molten sand) attack. Other past and present research interests include nanomaterials (synthesis, mechanical, functional behavior), scalable processing (thermal spray, sintering, additive manufacturing), novel biomaterials (structural, tissue engineering), tribology (low wear/friction materials), nanomechanics, UHTCs and MAX phases, and carbon nanoparticle reinforced composites (GNP/CNT/ND reinforced polymer/metal/ceramic matrix).

Education

Doctor of Philosophy Materials Science & Engineering **Sept. 2016**

University of California Davis, CA

Masters of Science Materials Science & Engineering **April 2013**

Florida International University, Miami, FL

Bachelors of Science Aerospace Engineering **May 2011**

University of Miami, Coral Gables, FL

Professional History

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- Oak Ridge Associated Universities (ORAU) Postdoctoral Fellow, VTD, *Sept. 2016 - Present*
US Army Research Laboratory, Aberdeen Proving Ground, MD
 - Graduate Student Researcher, Materials Science and Engineering Department, *Mar. 2016 - Sept. 2016*
University of California – Davis, Davis, CA
 - Teaching Assistant, Chemical Engineering and Materials Science Department, *Sept. 2015 – June 2016*
UC Davis, Davis, CA
 - Visiting NSF EAPSI Fellow, Center for Nano-Wear, *June 2015 – Aug. 2015*
Yonsei University, Seoul, South Korea
 - Eugene Cota-Robles Doctoral Fellow, CHMS, UC Davis, Davis, CA *Sept. 2013 – June 2015*
 - Research Engineer, Mechanical and Materials Engineering Department, *May 2013 – Sept. 2013*
Florida International University, Miami, FL
 - Research Assistant, MME, FIU, Miami, FL *May 2011 – April 2013*
 - Teaching Assistant, MME, FIU, Miami, FL *Jan. 2012 – Aug. 2012*

Research Interests

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- Design, synthesis, and properties of composites
 - Coatings (TBC, EBC, wear resistant)
 - Nanomaterials (GNP, CNT, BNNT, ND)
 - Ultra High Temperature Ceramics
 - MAX Phases
 - Tribology (dry sliding, abrasion, erosion, scratch)

- Nanoindentation
- Advanced Scalable Manufacturing

Review Activities

(i) Research Proposals and Grants:

- Naval Research Laboratory (NRL) / American Society for Engineering Education (ASEE) Postdoctoral Fellowship Program

(ii) Journals

- Energy Conversion and Management (Elsevier)
- Surface and Coatings Technology (Elsevier)
- Metallurgical and Materials Transactions A (TMS)
- Journal of the European Ceramic Society (Elsevier)
- Journal of Composite Materials (Sage)
- Journal of Engineering Tribology (Sage)

(iii) Conference Proceedings

- Turbomachinery Technical Conference and Exposition (Turbo Expo 2017), (ASME)

Publications

- 1) Murugan, M., Ghoshal, A., Walock, M., **Nieto, A.**, Barnett, B., Pepi, M., Swab, J., Rowe, C., Zhu, D., Kerner, K., “*Microstructure based material-sand particulate interactions and assessment of coatings for high temperature turbine blades*”, **Proceedings of the ASME 2017 Turbomachinery Technical Conference & Exposition**, In Press, 2017
- 2) **Nieto, A.**, Bisht, A., Lahiri, D., Zhang, C., Agarwal, A., “*Graphene Reinforced Metal and Ceramic Matrix Composites – A Review*”, **International Materials Reviews**, In Press, 2017
- 3) **Nieto, A.**, Kim, J., Penkov, O., Kim, D.-E., Schoenung, J.M., “*Elevated Temperature Wear Behavior of Thermally Sprayed WC-Co/Nanodiamond Composite Coatings*”, **Surface and Coatings Technology**, Vol. 315, pp. 283-293, 2017
- 4) **Nieto, A.**, “*Synthesis, Mechanical Behavior, and Multi-Scale Tribological Performance of Carbon Nanoparticle Reinforced Ceramic Composites*”, **ProQuest Electronic Thesis and Dissertations**, 2016
- 5) **Nieto, A.**, “*Exploring nature, history, and nano-diamonds in Korea*”, **American Ceramic Society Bulletin**, Vol. 95, pp. 56, 2016.
- 6) Zhang, C., **Nieto, A.**, Agarwal A., “*Ultrathin Graphene Tribofilm Formation during Wear of Al₂O₃-Graphene Composites*”, **Nanomaterials and Energy**, Vol. 5, pp. 1-9, 2016.
- 7) **Nieto, A.**, Zhao, J.M., Han, Y.-H., Hwang, K.H., Schoenung, J.M., “*Microscale Tribological Behavior and In Vitro Biocompatibility of Graphene Nanoplatelet Reinforced Alumina*”, **Journal of the Mechanical Behavior of Biomedical Materials**, Vol. 61, pp. 122-134, 2016
- 8) Koller, M., Seiner, H., Landa, M., **Nieto, A.**, Agarwal, A., “*Anisotropic Elastic and Acoustic Properties of Bulk Graphene Nanoplatelets Consolidated by Spark Plasma Sintering*”, **Acta Physica Polonica A**, Vol. 128, pp. 670-674, 2015
- 9) **Nieto, A.**, Dua, R., Zhang, C., Boesl, B., Ramaswamy, S., Agarwal, A., “*Three Dimensional Graphene Foam – Polymer Hybrid as a High Strength Biocompatible Scaffold*”, **Advanced Functional Materials**, Vol. 25, pp. 3916-3924, 2015

- 10) **Nieto, A.**, Huang, L., Han, Y.-H., Schoenung, J.M., “*Sintering Behavior of Spark Plasma Sintered Alumina with Graphene Nanoplatelet Reinforcement*”, **Ceramics International**, Vol. 41, pp. 5926-5936, 2015
- 11) **Nieto, A.**, Boesl, B., Agarwal, A., “*Multi-Scale Intrinsic Deformation Mechanisms of 3D Graphene Foam*”, **Carbon**, Vol. 85, pp. 299-308, 2015
- 12) **Nieto, A.**, Kumar, A., Lahiri, D., Zhang, C., Seal, S., Agarwal, A., “*Oxidation Behavior of Graphene NanoPlatelets Reinforced Tantalum Carbide composites in High Temperature Plasma Flow*”, **Carbon**, Vol. 67, pp. 398-408, 2014
- 13) Pitchuka, S.B., Boesl, B., Zhang, C., Lahiri, D., **Nieto, A.**, Sundararajan, G., Agarwal, A., “*Dry Sliding Wear Behavior of Cold Sprayed Aluminum Amorphous/Nanocrystalline Alloy Coatings*”, **Surface & Coatings Technology**, Vol. 238, pp. 118-125, 2014
- 14) **Nieto, A.**, Lahiri, D., Agarwal, A., “*Nano Dynamic Mechanical Behavior of Graphene NanoPlatelets Reinforced Tantalum Carbide*”, **Scripta Materialia**, Vol. 69, pp. 678-681, 2013
- 15) Agrawal, R., **Nieto, A.**, Chen, H., Mora, M., Agarwal, A., “*Nano-scale Damping Characteristics of Boron Nitride Nanotubes and Carbon Nanotubes Reinforced Polymer Composites*”, **ACS Applied Materials and Interfaces**, Vol. 5, pp. 12052-12057, 2013
- 16) **Nieto, A.**, Lahiri, D., Agarwal, A., “*Graphene NanoPlatelets Reinforced Tantalum Carbide Consolidated by Spark Plasma Sintering*”, **Materials Science and Engineering A**, Vol. 582, pp. 338-346, 2013
- 17) **Nieto, A.**, “*Graphene NanoPlatelets Reinforced Tantalum Carbide Consolidated by Spark Plasma Sintering*”, **FIU Electronic Thesis and Dissertations**, Paper 840, 2013
- 18) **Nieto, A.**, Lahiri, D., Agarwal, A., “*Synthesis and Properties of Bulk Graphene NanoPlatelets Consolidated by Spark Plasma Sintering*”, **Carbon**, Vol. 50, pp. 4067-4077, 2012
- 19) **Nieto, A.**, Perez, K., Rojas, M., Rodriguez, O., Fernandez, O., Salman, S., Zha, G.-C., “*Towards High Efficiency Hypersonic Flight – Hypersonic Bi-Directional Flying Wing*”, AIAA Paper 2012-0398, 50th AIAA Aerospace Sciences Meeting, Jan 9-12, 2012, Nashville, Tennessee

H-Index: 9 (~ 250 total citations) - *Source: Google Scholar*

Invited Talks

- 1) **Andy Nieto***, Julie M. Schoenung, “*Indentation Creep Behavior of WC-Co processed by HVOF and SPS*”, **Mechanical Behavior and Performance of Ceramics & Composites: Small-scale Testing and Applications, 41st International Conference and Expo on Advanced Ceramics and Composites**, Jan 22 – 27, 2017, Daytona Beach, Florida.
- 2) Anindya Ghoshal*, Muthuvel Murugan, Michael J. Walock, Blake Barnett, **Andy Nieto**, Marc S. Pepi, Jeffrey Swab, Dongming Zhu, W. Robert Gamble, “*Tailored Interfaces for Engineered High Temperature Propulsion Materials*”, **Materials for Extreme Environments: UHTCs and MAX Phases – Methods for Improving Damage Tolerance, Oxidation and Thermal Shock Resistance, 41st International Conference and Expo on Advanced Ceramics and Composites**, Jan 22 – 27, 2017, Daytona Beach, Florida
- 3) **Andy Nieto**, Cheng Zhang, Debrupa Lahiri, Arvind Agarwal*, “*Spark Plasma Sintered Tantalum Carbide with Graphene NanoPlatelets Reinforcement*”, **Advanced High Temperature Structural Materials: Processing of High Temperature Structural Materials I, The 8th Pacific Rim International Congress on Advanced Materials and Processing**, Aug 4-9, 2013, Waikoloa, Hawaii

- 4) **Andy Nieto***, Debrupa Lahiri, Cheng Zhang, Arvind Agarwal, “Graphene NanoPlatelets Reinforced Tantalum Carbide Consolidated by Spark Plasma Sintering”, *IREs: U.S.-Japan Collaborative Research and Education on Carbon based BioMEMS*, Aug 1-2, 2013, Kochi University of Technology, JAPAN

*Denotes Invited Speaker

Contributed Conference Presentations

- 1) **Nieto, A.**[†], Walock, M., Barnett, B.D., Ghoshal, A., Murugan, M., Pepi, M.S., Zhu, D., Pegg, R.T., Rowe, C.R., Gamble, W.R., Swab, J.J., Kerner, K.A., “Towards Sandphobic Thermal Barrier Coatings (TBCs) – Characterization of YSZ-Based TBCs Exposed to Sand Laden Combustion Flows, *15th Conference & Exhibition of the European Ceramic Society*, To be Presented July 9 – 13, 2017, Budapest, HUNGARY
- 2) Walock, M.J.[†], Heng, V., **Nieto, A.**, Ghoshal, A., Murugan, M., Driemeyer, D., “Application of CMC Materials to Exhaust Systems on Next Generation Vertical Lift Vehicles”, *53rd AIAA/SAE/ASEE Joint Propulsion Conference*, To be Presented July 10 – 12, 2017, Atlanta, Georgia
- 3) Murugan, M., Ghoshal, A., Walock, M., **Nieto, A.**, Barnett, B., Pepi, M., Swab, J., Rowe, C., Zhu, D., Kerner, K., “Microstructure based material-sand particulate interactions and assessment of coatings for high temperature turbine blades”, *ASME 2017 Turbomachinery Technical Conference & Exposition*, To be Presented June 26 – 30, 2017, Charlotte, North Carolina
- 4) Walock, M.J.[†], Heng, V., **Nieto, A.**, Ghoshal, A., Dreimeyer, D., Murugan, M., “High-temperature durability of oxide-oxide ceramic matrix composites exposed to engine-relevant conditions”, *12th Pacific Rim Conference on Ceramic and Glass Technology*, To be Presented May 21 – 26, 2017, Waikoloa, Hawaii
- 5) Walock, M.J.[†], Barnett, B.D., **Nieto, A.**, Ghoshal, A., Murugan, M., Swab, J.J., Pepi, M.S., Zhu, D., Pegg, R.T., Rowe, C.R., Kerner, K.A., “Investigation of the adhesion of glassified sand/salt deposits on thermal barrier coatings”, *International Conference on Metallurgical Coatings and Thin Films*, To be Presented April 24 – 28, 2017, San Diego, California
- 6) **Nieto, A.**[†], Yang, H., Schoenung, J.M., “Effect of Boron Carbide Particle Size on the Abrasive Wear Behavior of Al-B₄C Composites”, *Mechanical Behavior and Performance of Ceramics & Composites – Tribological Performance, 41st International Conference and Expo on Advanced Ceramics and Composites*, Jan 22 – 27, 2017, Daytona Beach, Florida
- 7) **Nieto, A.**[†], Kim, J., Kim, D.-E., Schoenung, J.M., “Fabrication, Mechanical Properties, and Multi-Scale Wear Behavior of Nanodiamond Reinforced WC-Co Composites”, *Advanced Structural Materials, XXV International Materials Research Congress*, Aug 14-19, 2016, Cancun, MEXICO.
- 8) **Nieto, A.**[†], Kim, J., Penkov, O., Kim, D.-E., Schoenung, J.M., “Elevated Temperature Wear Behavior of WC-Co/Nanodiamond Composite Coatings”, *Nanostructured Materials and Nanotechnology, XXV International Materials Research Congress*, Aug 14-19, 2016, Cancun, MEXICO.
- 9) Han, Y.-H.[†], Lee, J.H., **Nieto, A.**, Huang, L., Schoenung, J.M., Chen, F., Jin, D., Lee, J., Kim, S., “Fracture Toughness Enhancement of Spark Plasma Sintered Al₂O₃ and ZrO₂ Reinforced by Graphene Nanoplatelets (GNP)”, *Nano-Particles & Nano-Structured Materials, The 32nd International Japan-Korea Seminar on Ceramics*, Nov 18 – 21, 2015, Nagaoka, JAPAN
- 10) **Nieto, A.**[†], Huang, L., Han, Y.-H., Schoenung, J.M., “Nanotribological Behavior of Graphene Nanoplatelet Reinforced Alumina Nanocomposites”, *Mechanical Behavior and Performance of Ceramics & Composites – Tribology and Wear, 39th International Conference and Expo on Advanced Ceramics and Composites*, Jan 25 – 30, 2015, Daytona Beach, Florida.
- 11) **Nieto, A.**[†], Huang, L., Han, Y.-H., Schoenung, J.M., “Processing and Microstructural Evolution of Spark Plasma Sintered Alumina with Graphene Nanoplatelet Reinforcement”, *9th International Symposium on Advanced*

Processing and Manufacturing Technologies for Structural and Multifunctional Materials and Systems – Advanced Sintering Technologies, 39th International Conference and Expo on Advanced Ceramics and Composites, Jan 25 – 30, 2015, Daytona Beach, Florida.

- 12) Koller, M. †, Seiner, H., Landa, M., ***Nieto, A.***, Agarwal, A., “Anisotropic elastic and acoustic properties of bulk graphene nanoplatelets consolidated by spark plasma sintering”, ***13th International Symposium on Physics of Materials***, Aug 31 - Sept 4, 2014, Prague, CZECH REPUBLIC
- 13) ***Nieto, A.*** †, Lahiri, D., Zhang, C., Agarwal, A., “Enhancement of Tantalum Carbide Oxidation Resistance in a High Temperature Plasma Flow by Addition of Graphene NanoPlatelets”, ***Refractory Metal-Based Materials I, TMS Annual Meeting 2013***, Mar 3-7, 2013, San Antonio, Texas.
- 14) ***Nieto, A.*** †, Lahiri, D., Agarwal, A., “Effect of Graphene NanoPlatelets on Consolidation and Mechanical Properties of Spark Plasma Sintered Tantalum Carbide”, ***Hybrid and Hierarchical Composite Materials: Processing, TMS Annual Meeting 2013***, Mar 3-7, 2013, San Antonio, Texas.
- 15) ***Nieto, A.*** †, Lahiri, D., Zhang, C., Agarwal, A., “Oxidation Behavior of Graphene NanoPlatelets Reinforced Tantalum Carbide composites in High Temperature Plasma Flow”, ***Materials for Extreme Environments: UHTCs and MAX Phases - Structural Stability under Extreme Environments I, 37th International Conference and Expo on Advanced Ceramics and Composites***, Jan 27 - Feb 1, 2013, Daytona Beach, Florida.
- 16) ***Nieto, A.*** †, Lahiri, D., Agarwal, A., “Graphene NanoPlatelets Reinforced Tantalum Carbide Consolidated by Spark Plasma Sintering”, ***Materials for Extreme Environments: UHTCs and MAX Phases - Materials Design II, 37th International Conference and Expo on Advanced Ceramics and Composites***, Jan 27- Feb 1, 2013, Daytona Beach, Florida.
- 17) ***Nieto, A.*** †, Lahiri, D., Agarwal, A., “Synthesis and Properties of Bulk Graphene NanoPlatelets Consolidated by Spark Plasma Sintering”, ***TMS Student Technical Poster Competition, TMS Annual Meeting 2012***, Mar 11-15, 2012, Orlando, Florida.
- 18) ***Nieto, A.*** †, Perez, K., Rojas, M., Rodriguez, O., Fernandez, O., Salma, S., Zha, G., “Towards High Efficiency Hypersonic Flight – Hypersonic Bi-Directional Flying Wing”, ***Planetary Entry and Aeroassist Technology, 50th AIAA Aerospace Sciences Meeting***, Jan 9-12, 2012, Nashville, Tennessee.

† Denotes the Presenting Author