

CATERINA LAMUTA

*Department of Mechanical Engineering
The University of Iowa
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PROFESSIONAL POSITIONS

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|-----------|---|
| 2018-Pres | Assistant Professor,
Department of Mechanical Engineering,
The University of Iowa, Iowa City, IA. |
| 2017 | Postdoctoral Fellow,
Beckman Institute for Advanced Science and Technology,
University of Illinois at Urbana-Champaign, Urbana, IL.
Collaborators: Prof. Sameh Tawfick, Prof. Nancy Sottos, Prof. Paul Braun. |

EDUCATION

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| 2014-2017 | Ph.D.,
Mechanical Engineering,
Department of Mechanical, Energy and Management
Engineering, University of Calabria, Italy.
Adviser: Prof. Leonardo Pagnotta.
Thesis: Development and characterization of advanced ceramic materials. |
| 2011-2013 | Master of Science, <i>summa cum laude</i>,
Mechanical Engineering,
Department of Mechanical, Energy and Management |

Engineering, University of Calabria, Italy.

Adviser: Prof. Franco Furgiuele.

Thesis: Molecular dynamics applied to the mechanical characterization of materials.

2008-2011

Bachelor of Science *summa cum laude*,

Mechanical Engineering,

Department of Mechanical, Energy and Management Engineering, University of Calabria, Italy.

Adviser: Prof. Franco Furgiuele.

Thesis: Stretch-blow molding process for the fabrication of PET bottles.

HONORS AND AWARDS

2017

Beckman Postdoctoral Fellowship,

Beckman Institute for Advanced Science and Technology,
University of Illinois at Urbana-Champaign, Urbana, IL.

2013

Doctoral Fellowship,

University of Calabria, Italy.

2013

Master of Science Degree with Honors,

Department of Mechanical, Energy and Management Engineering, University of Calabria, Italy.

2011

Bachelor of Science Degree with Honors,

Department of Mechanical, Energy and Management Engineering, University of Calabria, Italy.

2009

Best student award from the College of Engineering,

University of Calabria, Italy.

MEDIA COVERAGE

- [Newsweek](#)
- [Eurekaalert!](#)
- [New atlas](#)
- [MechSE UIUC](#)
- [Digital trends](#)
- [Youtube](#)
- [Corriere della Calabria](#)
- [Nplus 1](#)
- [Xuehua](#)

RESEARCH INTERESTS

- Artificial Muscles;
- Design, modeling, fabrication, simulation, and characterization of smart materials and bio-inspired systems;
- Artificial camouflage;
- Mechanical and electro-mechanical characterization of materials at different length scales.

RESEARCH EXPERIENCE

2017-Pres

**Beckman Institute for Advanced Science and Technology,
University of Illinois at Urbana-Champaign, Urbana, IL.**

- Design, modeling, production and characterization of carbon fiber-reinforced coiled artificial muscles.
- Simulations and characterization of spiropyran-based mechanochemically responsive elastomers.
- Artificial camouflage: design and characterization of smart systems able to artificially reproduce color-change and texture modulation.

2016

**Department of Mechanical Science and Engineering,
University of Illinois at Urbana-Champaign, Urbana, IL.**

- Molecular dynamics simulations of martensitic transformation, shape memory effect and pseudoelasticity in ternary shape memory alloys, with particular attention to partially ordered atomic structures. Supervisor: Prof. Huseyin Sehitoglu.

2013-2017

Department of Mechanical, Energy and Management Engineering, University of Calabria, Italy.

- Characterization of nanostructured Yttria-Stabilized-Zirconia coatings by depth sensing indentation and tribological tests.
- Mechanical characterization of anisotropic materials (e.g., Bi₂Te₃, Bi₂Se₃, SnSe topological insulators) by depth-sensing nanoindentation.
- Production and characterization of nanocomposites (e.g., geopolymeric mortar matrix and graphene nanofillers): mechanical characterization by means of conventional mechanical tests, indentation tests and full field techniques (i.e. Digital Image Correlation); piezoresistive and piezoelectric characterization.

TEACHING EXPERIENCE

2014-2015

Teaching Assistant,

Department of Mechanical, Energy and Management Engineering,
University of Calabria, Italy.

Courses:

- Measurements Systems and Instrumentation (undergraduate level)
- Mechanics of Materials and Fundamental of the Finite Element Method (graduate level)
- Engineering Materials and Mechanical Design (graduate level)
- Mechanical Testing: conventional mechanical tests, instrumented indentation test, impact tests (graduate level)

STUDENTS SUPERVISED

Graduate students

- Demetrio Donato (M.S. 2017),
M.S. Thesis: Mechanical characterization of graphene reinforced geopolymer mortars.
- Antonio Piane (M.S. 2016),
M.S. Thesis: Piezoelectric characterization of graphene reinforced geopolymer mortars.
- Antonio Visini (M.S. 2015),
M.S. Thesis: Piezoresistive characterization of graphene reinforced geopolymer mortars.
- Antonello Mancari (M.S. 2015),
M.S. Thesis: Numerical analysis of a pressure vessel, reinforced by prs: dynamic behavior.
- Andrea Tallerico (M.S. 2015),
M.S. Thesis: Numerical analysis of a pressure vessel, reinforced by prs: static behavior.
- Federica Colli (M.S. 2014),
M.S. Thesis: Electro-mechanical characterization of graphene reinforced geopolymer mortars.
- Angelo Gerace (M.S. 2014),
M.S. Thesis: Electro-mechanical characterization of graphene reinforced geopolymer mortars.

Undergraduate students

- Jonathan Byers (2017),
Undergraduate research assistant.
- Michael Rogalski (2017),
Undergraduate research assistant.
- Honglu He (2017),
Undergraduate research assistant.
- Lance Zhou (2017),
Undergraduate research assistant.
- Maxim Lunin (2017),
Undergraduate research assistant.

- Damiano Tomaino (B.S. 2016),
B.S. Thesis: Mechanical characterization of geopolymers by depth-sensing indentation.
- Bruna Rachiele (B.S. 2015),
B.S. Thesis: Elastic characterization of isotropic materials by Digital Image Correlation and Brazilian Disk Test.
- Ivan Morano (B.S. 2015),
B.S. Thesis: Piezoelectric materials.
- Pierfrancesco Savaglia (B.S. 2015),
B.S. Thesis: Wear testing using Tribometer.
- Felice Pullano (B.S. 2015),
B.S. Thesis: Indentation fracture toughness of brittle materials.
- Bonifacio Monti (B.S. 2015),
B.S. Thesis: Cement-based piezoelectric materials: properties and applications.
- Fabio Di Costa (B.S. 2014),
B.S. Thesis: Wear testing.

OTHER EXPERIENCE

2012-2013

**Team Leader, Chassis and Vehicle Dynamics Engineer,
Formula SAE,**

Department of Mechanical, Energy and Management Engineering,
University of Calabria, Italy.

The University of Calabria Racing Team took part to the Formula SAE competition in 2012.

ACTIVE SCIENTIFIC AND PROFESSIONAL SOCIETY MEMBERSHIPS

- Member of ASME (The American Society of Mechanical Engineers)
- Member of MRS (Material Research Society)
- Member of SWE (Society of Women Engineers)
- Member of Grant Training Center Member Community

PUBLICATIONS

Book chapters

- [1] Alfano M., **Lamuta C.**, Chiarello G., Politano A., (2017), Elastic Properties and Electron–Phonon Coupling of Graphene/Metal Interfaces Probed by Phonon Dispersion. In: Morandi V., Ottaviano L. (eds) GraphITA. Carbon Nanostructures. Springer, Cham, DOI: https://link.springer.com/chapter/10.1007%2F978-3-319-58134-7_4.

Journal Publications

- [1] **Lamuta C.**, Messelot S., Tawfick S., (2018), *Theory of the tensile actuation of fiber reinforced coiled muscles*, Smart Materials and Structures, 27, 055018, DOI: <http://iopscience.iop.org/article/10.1088/1361-665X/aab52b/meta>.
- [2] Candamano S., Sgambitterra E., **Lamuta C.**, Rotella G., Pagnotta L., Crea F., *Effect of graphene nanoplatelets on properties of geopolymers mortars* (under review).
- [3] **Lamuta C.**, Campi D., Pagnotta L., Dasadia A., Cupolillo A., Politano A., (2018), *Determination of the mechanical properties of SnSe, a novel layered semiconductor*, Journal of Physics and Chemistry of Solids, 116, 306-312., DOI: <https://doi.org/10.1016/j.jpcs.2018.01.045>.
- [4] Sgambitterra E., **Lamuta C.**, Candamano S., Pagnotta L., (2018), *Brazilian Disk Test and Digital Image Correlation: a methodology for the mechanical characterization of brittle materials*, Materials and Structures 51:19, DOI: <https://doi.org/10.1617/s11527-018-1145-8>.
- [5] **Lamuta C.**, Bruno L., Candamano S., Pagnotta L., (2017), *Piezoresistive characterization of graphene/metakaolin based geopolymeric mortar composites*, MRS Advances, 2(61), 3773-3779, DOI: <https://doi.org/10.1557/adv.2017.595>.
- [6] Politano A., **Lamuta C.**, Chiarello G., (2017), *Cutting a Gordian Knot: Dispersion of plasmonic modes in Bi₂Se₃ topological insulator*, Applied Physics Letters 110, 211601, DOI: <https://doi.org/10.1063/1.4984109>.
- [7] **Lamuta C.**, Candamano S., Crea F., Pagnotta L., (2016), *Direct piezoelectric effect in geopolymeric mortars*, Materials & Design 107, 57–64, DOI: <https://doi.org/10.1016/j.matdes.2016.05.108>.
- [8] **Lamuta C.**, Campi D., Cupolillo A., Politano A., Aliev Z.V., Babanly M.B., Chulkov E.V., Pagnotta L., (2016), *Mechanical properties of Bi₂Te₃ topological insulator investigated by*

- density functional theory and nanoindentation*, Scripta Materialia 121, 50–55, DOI: <https://doi.org/10.1016/j.scriptamat.2016.04.036>.
- [9] **Lamuta C.**, Cupolillo A., Politano A., Aliev Z.V., Babanly M.B., Chulkov E.V., Pagnotta L., (2016), *Indentation fracture toughness of single-crystal Bi₂Te₃ topological insulator*, Nano Research 9, 1032–1042, DOI: <https://doi.org/10.1007/s12274-016-0995-z>.
- [10] **Lamuta C.**, Cupolillo A., Politano A., Aliev Z.V., Babanly M.B., (2016), Chulkov EV, Alfano M, Pagnotta L, *Nanoindentation of single-crystal Bi₂Te₃ Topological Insulators grown with the Bridgman-Stockbarger method*, Phys. Status Solidi B 253, 1082–1086, DOI: <http://onlinelibrary.wiley.com/doi/10.1002/pssb.201552760/full>.
- [11] **Lamuta C.**, Di Girolamo G., Pagnotta L., (2015), *Microstructural, mechanical and tribological properties of nanostructured YSZ coatings produced with different APS process parameters*, Ceramics International 41, 8904–8914, DOI: <https://doi.org/10.1016/j.ceramint.2015.03.148>.

Conferences

- [1] **Lamuta C.**, Kim T. A., Tawfick S., Sottos N., *Artificial Chromatophores from Coiled Carbon Fibers and Mechanoresponsive Polymers*, Gordon Research Conference, January 14-19, 2018, Ventura, CA, USA.
- [2] Candamano S., Sgambitterra E., **Lamuta C.**, Rotella G., Pagnotta L., Crea F., *Effect of graphene nanoplatelets on properties of geopolymers mortars*, The 7th Advanced Functional Materials and Devices (AFMD), December 18-23, 2017, Havana, Cuba.
- [3] Galloro A., **Lamuta C.**, Comel L., Tallerico A., *Numerical analysis of a pressure vessel, reinforced by prs: static behaviour*, 25th Annual International Conference on Composites or Nano Engineering (ICCE-25), July 16-22-31, 2017, Rome, Italy.
- [4] **Lamuta C.**, Candamano S., Crea F., Pagnotta L., *Direct piezoelectric effect in geopolymeric mortars*, Geopolymers workshop – IX Edition, Geopolymer composites, January 26-27, 2017, Napoli, Italy.
- [5] **Lamuta C.**, Bruno L., Candamano S., Pagnotta L., *Piezoresistive characterization of graphene/metakaolin based geopolymeric mortar nanocomposites*, XXV International Materials Research Congress, August 14-19, 2016, Cancun, Mexico.
- [6] Sgambitterra E., **Lamuta C.**, Candamano S., Pagnotta L., *Determination of elastic constants of isotropic materials by means of Brazilian Disk Test and Digital Image Correlation*, 44^o National Conference of the Italian Association for Stress Analysis (AIAS), September 2-5, 2015, Messina, Italy.
- [7] **Lamuta C.**, Di Girolamo G., Caliandro P., Pagnotta L., *Microstructure and Mechanical Properties of nanostructured plasma sprayed YSZ coatings*, 43^o National Conference of the Italian Association for Stress Analysis (AIAS), September 9-12, 2014, Rimini, Italy.

- [8] **Lamuta C.**, Di Girolamo G., Caliandro P., Pagnotta L., *Influence of process parameters on the microstructural and mechanical properties of plasma sprayed nanostructured YSZ coatings*, International Conference on Energy, Environment and Material Science (EEMAS), September 22-26, 2014, Saint Petersburg, Russia.

PERSONAL

Citizenship: Italian

Languages: Italian (native), English (fluent)

Saxophone and percussions player in a jazz band

Caterina Lamuta