Stanford

Matteo Cargnello

Assistant Professor of Chemical Engineering and, by courtesy, of Materials Science and Engineering

Curriculum Vitae available Online

CONTACT INFORMATION

- **Administrative Contact**

  Andrea M. Hubbard

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Bio

BIO

Matteo Cargnello is Assistant Professor of Chemical Engineering and Terman Faculty Fellow. His group research interests are in the preparation and use of uniform and tailored materials for heterogeneous catalysis and photocatalysis and the technological exploitation of nanoparticles and nanocrystals. Reactions of interest are related to sustainable energy generation and use, control of emissions of greenhouse gases, and better utilization of abundant building blocks (methane, biomass).
Dr. Cargnello received his Ph.D. in Nanotechnology in 2012 at the University of Trieste (Italy) and he was then a post-doctoral scholar in the Chemistry Department at the University of Pennsylvania (Philadelphia) before joining the Faculty at Stanford. He is the recipient of the ENI Award Debut in Research 2013, the European Federation of Catalysis Societies Award as best European Ph.D. thesis in catalysis in 2013, and the Sloan Fellowship in 2018.

ACADEMIC APPOINTMENTS

- Assistant Professor, Chemical Engineering
- Assistant Professor (By courtesy), Materials Science and Engineering

HONORS AND AWARDS

- Sloan Research Fellowship, Alfred P. Sloan Foundation (2018)
- Outstanding Poster Award, Catalysis Gordon Research Conference (2018)
- Hellman Fellow, Hellman Fellows Fund (2018)
- Junior award, European Rare Earth and Actinide Society (ERES) (2018)
- Young Scientist Prize, 16th International Congress on Catalysis, Beijing (China) (2016)
- Terman Faculty Fellow, Stanford University (2015)
- Best European PhD Thesis in Catalysis, European Federation of Catalysis Societies (EFCATS) (2013)
- ENI Award “Debut in Research”, ENI (2013)
- Levi Award, Italian Chemical Society (SCI) (2012)
- Inorganic Chemistry Division Award, Italian Chemical Society (SCI) (2012)

PROFESSIONAL EDUCATION

- PhD, University of Trieste , Nanotechnology (2012)

LINKS

- Cargnello Group Website: http://cargnellogroup.stanford.edu/

Teaching

COURSES

2018-19

- Fundamentals and Applications of Spectroscopy: CHEMENG 345, PHOTON 345 (Win)
- Separation Processes: CHEMENG 130 (Spr)
- Special Topics in Nanostructured Materials for Energy and the Environment: CHEMENG 521 (Aut, Win, Spr, Sum)
- When Chemistry Meets Engineering: CHEMENG 31N (Aut)

2017-18

- Fundamentals and Applications of Spectroscopy: CHEMENG 345, PHOTON 345 (Win)
- Separation Processes: CHEMENG 130 (Spr)
- Special Topics in Nanostructured Materials for Energy and the Environment: CHEMENG 521 (Aut, Win, Spr, Sum)
- The Chemical Engineering Profession: CHEMENG 10 (Aut)
- When Chemistry Meets Engineering: CHEMENG 31N (Aut)

2016-17

- Colloquium: CHEMENG 699 (Aut, Win, Spr)
- Fundamentals and Applications of Spectroscopy: CHEMENG 345, PHOTON 345 (Win)
- Separation Processes: CHEMENG 130 (Spr)
- Special Topics in Nanostructured Materials for Energy and the Environment: CHEMENG 521 (Aut, Win, Spr, Sum)
- When Chemistry Meets Engineering: CHEMENG 31N (Aut)

2015-16

- China Technology and Engineering: OSPGEN 136 (Sum)
- China Technology and Engineering: OSPGEN 36 (Sum)
- Separation Processes: CHEMENG 130 (Spr)
- Special Topics in Nanostructured Materials for Energy and the Environment: CHEMENG 521 (Aut, Win, Spr, Sum)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Joel Schneider

Postdoctoral Faculty Sponsor

Alexander Holm, Weixin Huang, Kun Che Kao, Dohyung Kim, Zhenwei Wu

Doctoral Dissertation Advisor (AC)

Ian McKay, Chengshuang Zhou

Postdoctoral Research Mentor

Kun Che Kao

Doctoral (Program)

Ian McKay

Publications

PUBLICATIONS

- **A rigorous electrochemical ammonia synthesis protocol with quantitative isotope measurements.** *Nature*
  Andersen, S. Z., Colic, V., Yang, S., Schwalbe, J. A., Nielander, A. C., McEnaney, J. M., Enemark-Rasmussen, K., Baker, J. G., Singh, A. R., Rohr, B. A., Statt, M. J., Blair, S. J., Mezzavilla, et al
  2019

- **Colloidal Nanocrystals as Building Blocks for Well-Defined Heterogeneous Catalysts** *CHEMISTRY OF MATERIALS*
  Cargnello, M.
  2019; 31 (3): 576–96

- **Colloidal nanocrystals for heterogeneous catalysis** *NANO TODAY*
  Losch, P., Huang, W., Goodman, E. D., Wrasman, C. J., Holm, A., Riscoe, A. R., Schwalbe, J. A., Cargnello, M.
  2019; 24: 15–47

- **Synthesis of Colloidal Pd/Au Dilute Alloy Nanocrystals and Their Potential for Selective Catalytic Oxidations.** *Journal of the American Chemical Society*
  Wrasman, C. J., Boubnov, A., Riscoe, A. R., Hoffman, A. S., Bare, S. R., Cargnello, M.
  2018

- **Deconvoluting Transient Water Effects on the Activity of Pd Methane Combustion Catalysts** *INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH*
  Huang, W., Goodman, E. D., Losch, P., Cargnello, M.
  2018; 57 (31): 10261–68

- **In Situ X-ray Scattering Guides the Synthesis of Uniform PtSn Nanocrystals.** *Nano letters*
  Wu, L., Fournier, A. P., Willis, J. J., Cargnello, M., Tassone, C. J.
  2018

- **Low-Temperature Restructuring of CeO2-Supported Ru Nanoparticles Determines Selectivity in CO2 Catalytic Reduction.** *Journal of the American Chemical Society*
  Aitbekova, A., Wu, L., Wrasman, C. J., Boubnov, A., Hoffman, A. S., Goodman, E. D., Bare, S. R., Cargnello, M.
  2018; 140 (42): 13736–45

- **High-temperature crystallization of nanocrystals into three-dimensional superlattices** *NATURE*
  Wu, L., Willis, J. J., McKay, I., Diroll, B. T., Qin, J., Cargnello, M., Tassone, C. J.
  2017; 548 (7666): 197-+

- **Systematic Identification of Promoters for Methane Oxidation Catalysts Using Size- and Composition-Controlled Pd-Based Bimetallic Nanocrystals.** *Journal of the American Chemical Society*
  Willis, J. J., Goodman, E. D., Wu, L., Riscoe, A. R., Martins, P., Tassone, C. J., Cargnello, M.
  2017; 139 (34): 11989–97

- **Elucidating the synergistic mechanism of nickel-molybdenum electrocatalysts for the hydrogen evolution reaction** *MRS COMMUNICATIONS*
  Mckay, I. S., Schwalbe, J. A., Goodman, E. D., Willis, J. J., Majumdar, A., Cargnello, M.
  2016; 6 (3): 241-246

- **Polycatenar Ligand Control of the Synthesis and Self-Assembly of Colloidal Nanocrystals** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Diroll, B. T., Jishkariani, D., Cargnello, M., Murray, C. B., Donnio, B.
  2016; 138 (33): 10508-10515

- **Revealing particle growth mechanisms by combining high-surface-area catalysts made with monodisperse particles and electron microscopy conducted at atmospheric pressure** *JOURNAL OF CATALYSIS*
  Zhang, S., Cargnello, M., Cai, W., Murray, C. B., Graham, G. W., Pan, X.
  2016; 337: 240-247

- **Engineering titania nanostructure to tune and improve its photocatalytic activity** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*

Cargnello, M., Montini, T., Smolin, S. Y., Priebe, J. B., Jaen, J. J., Doan-Nguyen, V. V., Mckay, I. S., Schwalbe, J. A., Pohl, M., Gordon, T. R., Lu, Y., Baxter, J. B., Brueckner, et al
2016; 113 (15): 3966-3971

- **Substitutional doping in nanocrystal superlattices** *NATURE*
  Cargnello, M., Johnston-Peck, A. C., Diroll, B. T., Wong, E., Datta, B., Damodhar, D., Doan-Nguyen, V. V., Herzing, A. A., Kagan, C. R., Murray, C. B.
  2015; 524 (7566): 450-?
- **Efficient Removal of Organic Ligands from Supported Nanocrystals by Fast Thermal Annealing Enables Catalytic Studies on Well-Defined Active Phases** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Cargnello, M., Chen, C., Diroll, B. T., Doan-Nguyen, V. V., Gorte, R. J., Murray, C. B.
  2015; 137 (21): 6906-6911
- **Dynamic structural evolution of supported palladium-ceria core-shell catalysts revealed by in situ electron microscopy.** *Nature communications*
  Zhang, S., Chen, C., Cargnello, M., Fornasiero, P., Gorte, R. J., Graham, G. W., Pan, X.
  2015; 6: 7778-?
- **Substitutional doping in nanocrystal superlattices.** *Nature*
  Cargnello, M., Johnston-Peck, A. C., Diroll, B. T., Wong, E., Datta, B., Damodhar, D., Doan-Nguyen, V. V., Herzing, A. A., Kagan, C. R., Murray, C. B.
  2015; 524 (7566): 450–53
- **Solution-Phase Synthesis of Titanium Dioxide Nanoparticles and Nanocrystals** *CHEMICAL REVIEWS*
  Cargnello, M., Gordon, T. R., Murray, C. B.
  2014; 114 (19): 9319-9345
- **Enhanced Energy Transfer in Quasi-Quaternary Nanocrystal Superlattices** *ADVANCED MATERIALS*
  Cargnello, M., Diroll, B. T., Gaulding, E. A., Murray, C. B.
  2014; 26 (15): 2419-2423
- **Control of Metal Nanocrystal Size Reveals Metal-Support Interface Role for Ceria Catalysts** *SCIENCE*
  Cargnello, M., Doan-Nguyen, V. V., Gordon, T. R., Diaz, R. E., Stach, E. A., Gorte, R. J., Fornasiero, P., Murray, C. B.
  2013; 341 (6147): 771-773
- **Exceptional Activity for Methane Combustion over Modular Pd@CeO2 Subunits on Functionalized Al2O3** *SCIENCE*
  Cargnello, M., Delgado Jaen, J. J., Hernandez Garrido, J. C., Bakhmutsky, K., Montini, T., Calvino Gamez, J. J., Gorte, R. J., Fornasiero, P.
  2012; 337 (6095): 713-717
- **Multiwalled Carbon Nanotubes Drive the Activity of Metal@oxide Core-Shell Catalysts in Modular Nanocomposites** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Cargnello, M., Grzelczak, M., Rodriguez-Gonzalez, B., Syrgiannis, Z., Bakhmutsky, K., La Parola, V., Liz-Marzan, L. M., Gorte, R. J., Prato, M., Fornasiero, P.
  2012; 134 (28): 11760-11766
- **Nonaqueous Synthesis of TiO2 Nanocrystals Using TiF4 to Engineer Morphology, Oxygen Vacancy Concentration, and Photocatalytic Activity** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Gordon, T. R., Cargnello, M., Paik, T., Mangolini, F., Weber, R. T., Fornasiero, P., Murray, C. B.
  2012; 134 (15): 6751-6761
- **Synthesis of Dispersible Pd@CeO2 Core-Shell Nanostructures by Self-Assembly** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Cargnello, M., Wieder, N. L., Montini, T., Gorte, R. J., Fornasiero, P.
  2010; 132 (4): 1402-1409