

contact information

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current position

January 2015 – Assistant Professor of Chemical Engineering

education

University of Pennsylvania, Post-doctoral Scholar
June 2012 – August 2014
Department of Chemistry, supervisor: Christopher B. Murray

University of Trieste (Italy), PhD in Nanotechnology
December 2011 (Thesis defended 29 March 2012), thesis title: “Tailored nanoarchitectures based on transition metals for heterogeneous catalysis”, supervisor: Prof. P. Fornasiero, tutors: Dr. T. Montini (University of Trieste), Prof. R. J. Gorte (University of Pennsylvania)

University of Trieste (Italy), “Laurea Magistrale” Degree in Chemistry (comparable to M.Sc.), July 2008, Summa cum Laude, thesis title: “Nanostructures based on palladium and gold as heterogeneous catalysts”, supervisor: Prof. P. Fornasiero

University of Trieste (Italy), “Laurea di Primo Livello” Degree in Chemistry (comparable to B.Sc.), July 2006, University of Trieste, Summa cum Laude, thesis title: “Synthesis of pyridine-containing thiols for the preparation of mixed monolayers onto gold nanoparticles”, supervisor: Prof. L. Pasquato

honors and awards

- Sloan Research Fellowship, Alfred P. Sloan Foundation, 2018
 - Junior award, European Rare Earth and Actinide Society, 2018
 - Young Scientist Prize, 16th International Congress on Catalysis, 2016
 - Terman Faculty Fellow, Stanford University, 2015-2017
 - EFCATS Award Best European PhD Thesis in Catalysis, 2013
 - ENI Award “Debut in Research”, 2013
 - Levi Award for the best paper of a researcher under 35, Italian Chemical Society (SCI), 2012
 - Best PhD Thesis in Inorganic Chemistry, Division of Inorganic Chemistry of the Italian Chemical Society (SCI), 2012
 - "Fernando Tommasini" award, PhD School in Nanotechnology, University of Trieste, 2011
 - University College for Sciences "L. Fonda" Scholarship, 2006-2008
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bibliometric details

H-index: 23; citations: 2700 (Source: Scopus, March 2018).



synergistic activities

reviewer for proposals submitted to Stanford Synchrotron Radiation Lightsource – SLAC National Accelerator Laboratory, and Center for Functional Nanomaterials – Brookhaven National Laboratory

junior mentor for AIChE Future Faculty Mentor Program, AIChE

editorial positions

editorial board, *Powder Technology*

editorial activity

regularly serve as reviewer for *Nature*, *Nature Materials*, *Science*, *Journal of the American Chemical Society*, *Angewandte Chemie International Edition*, *Advanced Materials*, *Nature Communications*, *Science Advances*, *ACS Catalysis*, *Journal of Catalysis*, *Chemistry of Materials*, *Nano Letters*, *ACS Nano*, *The Journal of Physical Chemistry*, *Langmuir*, *Chemical Communications*, *Energy and Environmental Science*, *Chemical Reviews*, *Catalysis Letters*, *AIChE Journal*

professional experiences

September – December 2014: Visiting Scientist in the Department of Chemistry, University of Pennsylvania

January - May 2012: Post-doctoral position in Heterogeneous Catalysis, University of Trieste (Italy), under a European Research Institute of Catalysis (ERIC) fellowship

April - September 2011: Visiting Graduate Student in the Department of Chemistry, University of Pennsylvania, Philadelphia (USA), in the group of Prof. Christopher B. Murray, working on monodisperse nanoparticles as catalyst components

June - July 2010: Visiting Graduate Student in the Department of Materials Science and Metallurgical Engineering and Inorganic Chemistry of the University of Cadiz, Spain, in the group of Dr. Juan José Delgado and Prof. Serafin Bernal working on the characterization of core-shell Pd@CeO₂ catalysts with advanced TEM techniques

September - December 2008: Visiting Undergraduate Student in the group of Prof. R. J. Gorte, Department of Chemical and Biomolecular Engineering, University of Pennsylvania, Philadelphia (USA), working under a grant from AFOSR (MURI) on fuel-dispersible catalysts

research interests

design and preparation of new materials for catalytic applications

characterization of catalysts under working conditions

development of synthetic strategies to active catalysts

synthesis of functional nanoparticles for catalytic applications



memberships

Italian Chemical Society (SCI)
American Chemical Society (ACS)
Materials Research Society (MRS)
American Institute of Chemical Engineers (AIChE)

journal articles (peer-reviewed – bold indicates corresponding author)

1. Holm, A.; Park, J.; Goodman, E. D.; Zhang, J.; Sinclair, R.; Cargnello, M.; Frank, C. W. "Synthesis, Characterization and Light-Induced Spatial Charge Separation in Janus Graphene Oxide.", *Chem. Mater.* **2018**, *in press*, doi: 10.1021/acs.chemmater.8b00087.
2. Wu, L.; Lian, H.; Willis, J. J.; Goodman, E. D.; McKay, I. S.; Qin, J.; Tassone, C. J.; Cargnello, M. "Tuning Precursor Reactivity towards Nanometer-Size Control in Palladium Nanoparticles Studied by in-Situ Small Angle X-ray Scattering.", *Chem. Mater.* **2018**, *30*, 1127-1135.
3. Willis, J. J.; Gallo, A.; Sokaras, D.; Aljama, H.; Nowak, S. H.; Goodman, E. D.; Wu, L.; Tassone, C. J.; Jaramillo, T. F.; Abild-Pedersen, F.; Cargnello, M. "Systematic Structure-Property Relationship Studies in Palladium-Catalyzed Methane Complete Combustion.", *ACS Catal.* **2017**, *7*, 7810-7821.
4. Willis, J. J.; Goodman, E. D.; Wu, L.; Riscoe, A. R.; Martins, P.; Tassone, C. J.; Cargnello, M. "Systematic Identification of Promoters for Methane Oxidation Catalysts by Using Size- and Composition-Controlled Pd-based Bimetallic Nanocrystals.", *J. Am. Chem. Soc.* **2017**, *139*, 11989-11997.
5. Wu, L.; Willis, J. J.; McKay, I.; Diroll, B. T.; Qin, J.; Cargnello, M.; Tassone, C. J. "High-Temperature Crystallization of Nanocrystals into Three-Dimensional Superlattices.", *Nature* **2017**, *548*, 197-201.
6. Lin, C.-C.; Cargnello, M.; Murray, C. B.; Clarke, N.; Winey, K. I.; Riggelman, R. A.; Composto, R. J. "Nanorod Mobility Influences Polymer Diffusion in Polymer Nanocomposites.", *ACS Macro Lett.* **2017**, *6*, 869-874.
7. McEnaney, J. M.; Singh, A. R.; Schwalbe, J. A.; Kibsgaard, J.; Lin, J.; Cargnello, M.; Jaramillo, T. F.; Nørskov, J. K. "Ammonia Synthesis from N₂ and H₂O using a Lithium Cycling Electrification Strategy at Atmospheric Pressure.", *Energy Environ. Sci.* **2017**, *10*, 1621-1630.
8. Goodman, E. D.; Dai, S.; Yang, A.-C.; Wrasman, C.; Gallo, A.; Bare, S. R.; Hoffman, A. S.; Jaramillo, T. F.; Graham, G. F.; Pan, X.; Cargnello, M. "Uniform Pt/Pd Bimetallic Nanocrystals Demonstrate Platinum Effect on Palladium Methane Combustion Activity and Stability.", *ACS Catal.* **2017**, *7*, 4372-4380.
9. Agarwal, D.; Aspetti, C. O.; Cargnello, M.; Ren, M.; Yoo, J.; Murray, C. B.; Agarwal, R. "Engineering Localized Surface Plasmon Interactions in Gold by Silicon Nanowire for Enhanced Heating and Photocatalysis.", *Nano Lett.* **2017**, *17*, 1839-1845.
10. Paik, T.; Yun, H.; Fleury, B.; Hong, S.-H.; Jo, P. S.; Wu, Y.; Oh, S.-J.; Cargnello, M.; Yang, H.; Murray, C. B.; Kagan, C. R. "Hierarchical Materials Design by Pattern Transfer Printing of Self-Assembled Binary Nanocrystal Superlattices.", *Nano Lett.* **2017**, *17*, 1387-1394.
11. Singh, A. R.; Rohr, B. A.; Schwalbe, J. A.; Cargnello, M.; Chan, K.; Jaramillo, T. F.; Chorkendorff, I.; Nørskov, J. K. "Electrochemical Ammonia Synthesis - The Selectivity Challenge.", *ACS Catal.* **2017**, *7*, 706-709.
12. Valenti, G.; Boni, A.; Melchionna, M.; Cargnello, M.; Nasi, L.; Bertoni, G.; Gorte, R. J.; Marcaccio, M.;



- Rapino, S.; Bonchio, M.; Fornasiero, P.; Prato, M.; Paolucci, F. "Co-axial heterostructures integrating palladium/titanium dioxide with carbon nanotubes for efficient electrocatalytic hydrogen evolution.", *Nature Commun.* **2016**, *7*, 13549.
13. McKay, I. S.; Schwalbe, J. A.; Goodman, E. D.; Willis, J. J.; Majumdar, A.; Cargnello, M. "Elucidating the synergistic mechanism of Ni-Mo electrocatalysts for the hydrogen evolution reaction.", *MRS Commun.* **2016**, *6*, 241-246.
 14. Diroll, B.; Jishkariani, D.; Cargnello, M.; Murray, C.; Donnio, B. "Polycatenar Ligand Control of the Synthesis and Self-Assembly of Colloidal Nanocrystals.", *J. Am. Chem. Soc.* **2016**, *138*, 10508-10515.
 15. Bennett, D. A.; Cargnello, M.; Diroll, B. T.; Murray, C. B.; Vohs, J. M. "Shape-dependent activity of the thermal and photochemical reactions of methanol on nanocrystalline anatase TiO₂.", *Surf. Sci.* **2016**, *654*, 1-7.
 16. Zhang, S.; Plessow, P. N.; Willis, J. J.; Dai, S.; Xu, M.; Graham, G. W.; Cargnello, M.; Abild-Pedersen, F.; Pan, X. "Dynamical Observation and Detailed Description of Catalysts under Strong Metal-Support Interaction.", *Nano Lett.* **2016**, *16*, 4528-4534.
 17. Cargnello, M.; Montini, T.; Smolin, S. Y.; Priebe, J. B.; Delgado Jaén, J. J.; Doan-Nguyen, V. V. T.; McKay, I. S.; Schwalbe, J. A.; Pohl, M.-M.; Gordon, T. R.; Lu, Y.; Baxter, J. B.; Brückner, A.; Fornasiero, P.; Murray, C. B. "Engineering Titania Nanostructure to Tune and Improve Its Photocatalytic Activity.", *Proc. Natl. Acad. Sci. USA* **2016**, *113*, 3966-3971.
 18. Zhang, S.; Cargnello, M.; Cai, W.; Murray, C. B.; Graham, G.; Pan, X. "Revealing Particle Growth Mechanisms by Combining High-Surface-Area Catalysts Made with Monodisperse Particles and Electron Microscopy Conducted at Atmospheric Pressure.", *J. Catal.* **2016**, *337*, 240-247.
 19. Cargnello, M.; Doan-Nguyen, V. V. T.; Murray, C. B. "Engineering uniform nanocrystals: mechanism of formation and self-assembly into bimetallic nanocrystal superlattices.", *AIChE J.* **2016**, *62*, 392-398.
 20. Diroll, B.; Weigandt, K.; Jishkariani, D.; Cargnello, M.; Murphy, R.; Hough, L.; Murray, C.; Donnio, B. "Quantifying 'Softness' of Organic Coatings on Gold Nanoparticles using Correlated Small-Angle X-Ray and Neutron Scattering.", *Nano Lett.* **2015**, *15*, 8008-8012.
 21. Cargnello, M.*; Johnston-Peck, A. C.*; Diroll, B. T.*; Wong, E.; Datta, B.; Damodhar, D.; Doan-Nguyen, V. V. T.; Herzing, A. A.; Kagan, C. R.; Murray, C. B. "Substitutional doping in nanocrystals superlattices", *Nature* **2015**, *524*, 450-453, cover article "Midas touch" (* = equal contribution), highlighted in Nature Nanotechnology 2015, 10, 828.
 22. Choi, J.; Cargnello, M.; Murray, C. B.; Clarke, N.; Winey, K. I.; Composto, R. J. "Fast Nanorod Diffusion through Entangled Polymer Melts.", *ACS Macro Lett.* **2015**, *4*, 952-956.
 23. 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*, 10728-10734.
 24. Cargnello, M.*; Agarwal, R.*; Klein, D. R.; Diroll, B. T.; Agarwal, R.; Murray, C. B. "Uniform Bimetallic Nanocrystals by High-Temperature Seed-Mediated Colloidal Synthesis and Their Catalytic Properties for Semiconducting Nanowire Growth.", *Chem. Mater.* **2015**, *27*, 5833-5838 (* = equal contribution).
 25. Zhang, S.; Chen, C.; Cargnello, M.; Fornasiero, P.; Gorte, R. J.; Graham, G.; Pan, X. "Dynamic nature of structural evolution of supported Pd@CeO₂ revealed by in-situ electron microscopy",



- Nature Commun.* **2015**, *6*, 7778.
26. Bennett, D. A.; Cargnello, M.; Gordon, T. R.; Murray, C. B.; Vohs, J. M. "Thermal and photochemical reactions of methanol on nanocrystalline anatase TiO₂ thin films.", *Phys. Chem. Chem. Phys.* **2015**, *17*, 17190-17201.
 27. Arroyo-Ramírez, L.; Chen, C.; Cargnello, M.; Murray, C. B.; Gorte, R. J. "A Comparison of Hierarchical Pt@CeO₂/Si-Al₂O₃ and Pd@CeO₂/Si-Al₂O₃.", *Catal. Today* **2015**, *253*, 137-141.
 28. Cargnello, M.; Chen, C.; Diroll, B. T.; Doan-Nguyen, V. V. T.; Gorte, R. J.; Murray, C. B. "Efficient Removal of Organic Ligands From Supported Nanocrystals by Fast Thermal Annealing Enables Catalytic Studies on Well Defined Active Phases.", *J. Am. Chem. Soc.* **2015**, *137*, 6906-6911.
 29. Cargnello, M.; Sala, D.; Chen, C.; D'Arienzo, M.; Gorte, R. J.; Murray, C. B. "Structure, morphology and catalytic properties of pure and alloyed Au-ZnO hierarchical nanostructures.", *RSC Adv.* **2015**, *5*, 41920-41922.
 30. Martinez, J. M. P.; Kim, S.; Morales, E. H.; Diroll, B. T.; Cargnello, M.; Gordon, T. R.; Murray, C. B.; Bonnell, D. A.; Rappe, A. M. "Synergistic Oxygen Evolving Activity of a TiO₂-rich Reconstructed SrTiO₃(001) Surface.", *J. Am. Chem. Soc.* **2015**, *137*, 2939-2947.
 31. Diroll, B. T.; Doan-Nguyen, V. V. T.; Cargnello, M.; Gauldin, E. A.; Kagan, C. R.; Murray, C. B. "X-Ray Mapping of Nanoparticle Superlattice Thin Films.", *ACS Nano* **2014**, *8*, 12843-12850.
 32. Arroyo-Ramírez, L.; Chen, C.; Cargnello, M.; Murray, C. B.; Fornasiero, P.; Gorte, R. J. "Supported Platinum-Zinc Oxide Core-Shell Nanoparticle Catalysts for Methanol Steam Reforming.", *J. Mater. Chem. A.* **2014**, *2*, 19509-19514.
 33. Er, D.; Li, J.; Cargnello, M.; Fornasiero, P.; Gorte, R. J.; Shenoy, V. B. "A Novel Model to Determine the Chemical Expansion in Non-stoichiometric Oxides Based on the Elastic Force Dipole.", *J. Electrochem. Soc.* **2014**, *161*, F3060-F3064.
 34. Chen, C.; Yeh, Y.-H.; Cargnello, M.; Murray, C. B.; Fornasiero, P.; Gorte, R. J. "Methane Oxidation on Pd@ZrO₂/Si-Al₂O₃ is Enhanced by Surface Reduction of ZrO₂.", *ACS Catal.* **2014**, *4*, 3902-3909.
 35. Chen, C.; Shi, M.; Cargnello, M.; Fornasiero, P.; Murray, C. B.; Gorte, R. J. "Au@TiO₂ Core-Shell Nanostructures with High Thermal Stability." *Catal. Lett.* **2014**, *144*, 1939-1945.
 36. Cargnello, M.; Diroll, B. T.; Gauldin, E. A.; Murray, C. B. "Enhanced energy transfer in quasi-quaternary nanocrystal superlattices." *Adv. Mater.* **2014**, *26*, 2419-2423.
 37. Cargnello, M.; Doan-Nguyen, V.; Gordon, T. R.; Paik, T.; Diaz, R. E.; Stach, E. A.; Gorte, R. J.; Fornasiero, P.; Murray, C. B. "Control of Metal Nanocrystal Size Reveals Metal-Support Interface Role for Ceria Catalysts.", *Science* **2013**, *341*, 771-773, featured in PennNews.
 38. Adijanto, L.; Sampath, A.; Yu, A.; Cargnello, M.; Fornasiero, P.; Gorte, R. J.; Vohs, J. "Synthesis and Stability of Pd@CeO₂ Core-Shell Catalyst Films in Solid Oxide Fuel Cell Anodes.", *ACS Catal.* **2013**, *3*, 1801-1809.
 39. Chen, C.; Cao, J.; Cargnello, M.; Fornasiero, P.; Gorte, R. J. "High Temperature Calcination Improves the Catalytic Properties of Alumina-Supported Pd@Ceria Prepared by Self Assembly.", *J. Catal.* **2013**, *306*, 109-115.
 40. Adijanto, L.; Bennett, D. A.; Chen, C.; Yu, A. S.; Cargnello, M.; Fornasiero, P.; Gorte, R. J.; Vohs, J. M. "Exceptional Thermal Stability of Pd@CeO₂ Core-Shell Catalyst Nanostructures Grafted onto an Oxide Surface.", *Nano Lett.* **2013**, *13*, 2252-2257.
 41. Kang, Y.; Li, M.; Cai, Y.; Cargnello, M.; Diaz, R. E.; Gordon, T. R.; Wieder, N. L.; Adzic, R. R.; Gorte, R. J.; Stach, E. A.; Murray, C. B. "Heterogeneous catalysts need not to be so "heterogeneous":



- monodisperse Pt nanocrystals by combining shape-controlled synthesis and purification by colloidal recrystallization.", *J. Am. Chem. Soc.* **2013**, *135*, 2741-2747.
42. Kumar Meher, S.; Cargnello, M.; Troiani, H.; Montini, T.; Ranga Rao, G.; Fornasiero, P. "Alcohol induced ultra-fine dispersion of Pt on tuned morphologies of CeO₂ for low temperature CO oxidation.", *Appl. Catal. B* **2013**, *130-131*, 121-131.
 43. Cargnello, M.; Delgado Jaén, J. J.; Hernández Garrido, J. C.; Bakhmutsky, K.; Montini, T.; Calvino Gamez, J. J.; Gorte, R. J.; Fornasiero, P. "Exceptional activity for methane combustion over modular Pd@CeO₂ subunits on functionalized Al₂O₃.", *Science* **2012**, *337*, 713-717, featured in PennNews, C&EN, MRS Bulletin (USA), La Repubblica (Italy), Der Spiegel (Germany) and many other international sources; accompanied by the Perspective Article by R. J. Farrauto *Science* **2012**, *337*, 659.
 44. 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. "Multiwalled Carbon Nanotubes Drive the Activity of Metal@oxide Core-Shell Catalysts in Modular Nanocomposites.", *J. Am. Chem. Soc.* **2012**, *134*, 11760-11766, featured as JACS Spotlight by C. Brownlee *J. Am. Chem. Soc.* **2012**, *134*, 13143.
 45. Gordon, T. R.; Cargnello, M.; Paik, T.; Mangolini, F.; Weber, R. T.; Fornasiero, P.; Murray, C. B. "Nonaqueous Synthesis of TiO₂ nanocrystals Using TiF₄ to Engineer Morphology, Oxygen Vacancy Concentration, and Photocatalytic Activity.", *J. Am. Chem. Soc.* **2012**, *134*, 6751-6761.
 46. Bakhmutsky, K.; Wieder, N. L.; Cargnello, M.; Galloway, B.; Fornasiero, P.; Gorte, R. J. "A Versatile Route to Core-Shell Catalysts: Synthesis of Dispersible M@Oxide (M = Pd, Pt; Oxide = TiO₂, ZrO₂) Nanostructures by Self-Assembly.", *ChemSusChem* **2012**, *5*, 140-148.
 47. Cargnello, M.; Wieder, N. L.; Canton, P.; Montini, T.; Giambastiani, G.; Benedetti, A.; Gorte, R. J.; Fornasiero, P. "A Versatile Approach to the Synthesis of Functionalized Thiol-protected Palladium Nanoparticles.", *Chem. Mater.* **2011**, *23*, 3961-3969.
 48. Kim, J.-S.; Wieder, N. L.; Abraham, A. J.; Cargnello, M.; Fornasiero, P.; Gorte, R. J.; Vohs, J. M. "Highly Active and Thermally Stable Core-Shell Catalysts for Solid Oxide Fuel Cells.", *J. Electrochem. Soc.* **2011**, *158*, B596-B600.
 49. Wieder, N. L.; Cargnello, M.; Bakhmutsky, K.; Montini, T.; Fornasiero, P.; Gorte, R. J. "A study of the water-gas-shift reaction over Pd@CeO₂/Al₂O₃ core-shell catalysts.", *J. Phys. Chem. C* **2011**, *115*, 915-919.
 50. Cargnello, M.; Gentilini, C.; Montini, T.; Fonda, E.; Mehraeen, S.; Chi, M.; Herrera-Collado, M.; Browning, N. D.; Polizzi, S.; Pasquato, L.; Fornasiero, P. "Active and stable embedded Au@CeO₂ catalysts for preferential oxidation of CO.", *Chem. Mater.* **2010**, *22*, 4335-4345.
 51. Gombac, V.; Sordelli, L.; Montini, T.; Delgado, J. J.; Adamski, A.; Adami, G.; Cargnello, M.; Bernal, S.; Fornasiero, P. "CuO_x-TiO₂ Photocatalysts for H₂ Production from Ethanol and Glycerol Solutions.", *J. Phys. Chem. A* **2010**, *114*, 3916-3925.
 52. Cargnello, M.; Wieder, N. L.; Montini, M.; Gorte, R. J.; Fornasiero, P. "Synthesis of dispersible Pd@CeO₂ nanostructures by self-assembly.", *J. Am. Chem. Soc.* **2010**, *132*, 1402-1409.
 53. Cargnello, M.; Montini, T.; Polizzi, S.; Wieder, N. L.; Gorte, R. J.; Graziani, M.; Fornasiero, P. "Novel embedded Pd@CeO₂ catalysts: a way to active and stable catalysts.", *Dalton Trans.* **2010**, *39*, 2122-2127.
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reviews and perspectives (peer-reviewed – bold indicates corresponding author)

1. **Cargnello, M.** “Formic Acid Dehydrogenation: Phosphides Strike Again.”, *Joule* **2018**, 2, 379-380.
 2. Goodman, E. D.; Schwalbe, J. A.; **Cargnello, M.** “Mechanistic Understanding and the Rational Design of Sinter-Resistant Heterogeneous Catalysts.”, *ACS Catal.* **2017**, 7, 7156-7173.
 3. **Cargnello, M.**; Gordon, T. R.; Murray, C. B. “Solution Phase Synthesis of Titanium Dioxide Nanoparticles and Nanocrystals.”, *Chem. Rev.* **2014**, 114, 9319-9345.
 4. **Cargnello, M.**; Diroll, B. T. “Tailoring photocatalytic nanostructures for sustainable hydrogen production.”, *Nanoscale* **2014**, 6, 97-105, invited feature article.
 5. **Cargnello, M.**; Fornasiero, P.; Gorte, R. J. “Playing with structures at the nanoscale: designing catalysts by manipulation of clusters and nanocrystals as building blocks”, *ChemPhysChem* **2013**, 14, 3869-3877, cover article.
 6. **Cargnello, M.**; Fornasiero, P.; Gorte, R. J. “Opportunities for Tailoring Catalytic Properties Through Metal-Support Interactions.”, *Catal. Lett.* **2012**, 142, 1043-1048, invited Perspective article.
 7. **Cargnello, M.**; Gasparotto, A.; Gombac, V.; Montini, T.; Barreca, D.; Fornasiero, P. "Photocatalytic H₂ and added-value byproducts: the role of metal oxide systems in their synthesis from liquid oxygenates.", *Eur. J. Inorg. Chem.* **2011**, 2011, 4309-4323, selected as cover article.
 8. de Rogatis, L.; **Cargnello, M.**; Gombac, V.; Lorenzut, B.; Montini, T.; Fornasiero, P. “Embedded phases: a way to active and stable catalysts.”, *ChemSusChem* **2010**, 3, 24-42.
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patents

1. **Cargnello, M.**; Gorte, R. J.; Fornasiero, P. “Core-Shell Nanoparticulate Compositions And Methods”, US Patent US-2014-0106260-A1.
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book chapters (non-peer-reviewed)

1. Melchionna, M.; Fornasiero, P.; **Cargnello, M.** “Opportunities and challenges in the synthesis, characterization, and catalytic properties of controlled nanostructures.” In Morphological, Compositional, and Shape Control of Materials for Catalysis, first edition, P. Fornasiero and M. Cargnello Eds., Elsevier, Amsterdam, *Studies in Surface Science and Catalysis* **2017**, 177, 1-56.
 2. **Cargnello, M.**; Gorte, R. J.; Fornasiero, P. “Core-shell-type materials based on ceria.”, pp. 361-396 in Catalysis by Ceria and related Materials, second edition, A. Trovarelli and P. Fornasiero Eds., in "Catalytic Science Series" (G.J. Hutchings, ed.), Imperial College Press, London, **2013**.
 3. **Cargnello, M.**; Fornasiero, P. “Photocatalysis by nanostructured TiO₂ based semiconductors.”, pp. 89-136 in Handbook of Green Chemistry, Green Nanoscience, M. Selva and A. Perosa Eds., Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, **2012**.
 4. de Rogatis, L.; Montini, T.; Gombac, V.; **Cargnello, M.**; Fornasiero, P. “Stabilized metal nanoparticles embedded into porous oxides: a challenging approach for robust catalysts.”, pp. 71-123 in Nanorods, Nanotubes and Nanomaterials Research Progress, Wesley V. Prescott and Arnold I. Schwartz Editors, Nova Science Publishers, New York, **2008**.
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contributed and invited talks

1. (*invited*) ACS Spring Meeting, New Orleans, LA, March 18th 2018, “In-situ scattering techniques to study synthesis and crystallization processes of colloidal nanocrystals”.



2. *(invited)* ACS Spring Meeting, New Orleans, LA, March 18th 2018, “Understanding and Tuning Catalytic Materials For Methane Activation Using Nanocrystal Precursors”.
3. *(invited)* University of Utah, Department of Chemical Engineering, Salt Lake City, UT, March 5th 2018, “Understanding and Tuning Catalytic Materials Using Nanocrystal Precursors”.
4. *(invited)* 5th Nano Today Conference, Hawaii, USA, December 8th 2017, “Understanding and Tuning Catalytic Materials Using Nanocrystal Precursors”.
5. *(invited)* Brown University, Department of Chemistry, Providence, RI, December 1st 2017, “Understanding and Tuning Catalytic Materials Using Nanocrystal Precursors”.
6. *(invited)* Italian Embassy in Washington D.C., ISSNAF Annual Event, Washington, D.C., November 8th 2017, “Tackling Big Challenges Using Tiny Crystals”.
7. *(invited)* ACS Fall Meeting, Washington D.C., August 20th 2017, “Understanding and Controlling the Activity and Stability of Pd/Pt oxide Catalysts for Methane Activation”.
8. *(invited)* Catalysis Research PI Meeting, Department of Energy Office of Science, Gaithersburg, MD, July 27th 2017, “Understanding and Tuning Catalytic Materials Using Nanocrystal Precursors”.
9. *(invited)* Northwestern University, Department of Chemistry, Evanston, IL, June 2nd 2017, “From Model Systems to Efficient Catalytic Materials: One Nanocrystal Fits All”.
10. *(invited)* Argonne National Laboratory, Lemont, IL, June 1st 2017, “From Model Systems to Efficient Catalytic Materials: One Nanocrystal Fits All”.
11. *(invited)* James Franck Institute, University of Chicago, Chicago, IL, May 31st 2017, “Tackling Big Challenges Using Tiny Crystals”.
12. *(invited)* Spring MRS Meeting, Phoenix, AZ, April 20th 2017, “Enhanced energy transfer and doping in semiconductor-metal nanocrystal superlattices”.
13. *(invited)* March 2017 NorCal AIChE South Bay Meeting, Menlo Park, CA, March 21st 2017, “Tackling Big Challenges Using Tiny Crystals”.
14. *(invited)* Eastern Mediterranean Chemical Engineering Conference (EMCC8), Haifa, Israel, February 28th 2017, “Tackling Big Challenges Using Tiny Crystals”.
15. *(invited)* National Institute for Standards and Technology (NIST), Gaithersburg, MD, November 21st 2016, “Tiny crystals for big energy and environmental challenges”.
16. *(contributed)* AIChE Annual Meeting, San Francisco, CA, 17th November 2016, “Engineering Highly Active Brookite Titania Nanorods For Sustainable Hydrogen Production”.
17. *(contributed)* AIChE Annual Meeting, San Francisco, CA, 16th November 2016, “Substitutional Doping in Nanocrystal Superlattices”.
18. *(invited)* “In situ Catalysis with Advanced X-ray Methods”, SLAC Annual Users Meeting, October 7th 2016, “Well-defined nanocrystals as active catalysts and premier materials for spectroscopic studies of surface processes”.
19. *(contributed)* 16th International Congress on Catalysis, Beijing, China, July 5th 2016, “Uniform nanostructures for heterogeneous catalysis by fast annealing of monodisperse metal nanocrystals”.
20. *(invited)* Materials Design and Processing From Nano to Mesoscale, CHESS/Cornell University, Ithaca, NY, 14th June 2016, “Well-defined metal nanocrystals: synthesis, self-assembly, and applications”.
21. *(invited)* Nanolytica 2016, Berkeley University, Berkeley, CA, May 20th 2016, “Tackling big



- challenges using tiny crystals”.
22. *(invited)* Materials Research Society Spring Meeting 2016, Phoenix, AZ, 31st March 2016, “Engineering Highly Active Brookite Titania Nanorods for Sustainable Hydrogen Production”.
 23. *(invited)* Nanoseminar Series, University of California – Berkeley, Berkeley, CA, 19th February 2016, “Tackling big challenges using tiny crystals”.
 24. *(invited)* SLAC National Acceleration Laboratory, Menlo Park, CA, 15th December 2015, “Tackling big challenges using tiny crystals”.
 25. *(invited)* University of Michigan, Department of Materials Science, Ann Arbor, MI, 18th November 2015, “Tackling big challenges using tiny crystals”.
 26. *(contributed)* AIChE Annual Meeting, Salt Lake City, UT, 12th November 2015, “Efficient Removal of Organic Ligands from Supported Nanocrystals By Fast Thermal Annealing Enables Catalytic Studies on Well-Defined Active Phases”.
 27. *(invited)* Stanford Synchrotron Radiation Lightsource (SSRL) Scientific Advisory Committee meeting, SLAC, Menlo Park, CA, 10th September 2015, “Tackling big challenges using tiny crystals”.
 28. *(invited)* Meta 2015 International Conference on Metamaterials, City College of New York, New York City, NY, 7th August 2015, “Nanocrystal superlattices as tunable metamaterial assemblies”.
 29. *(invited)* Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley, CA, 14th July 2015, “Tackling big challenges using tiny crystals”.
 30. *(invited)* PARC Inc., Palo Alto, CA, 26th June 2015, “Tackling big challenges using tiny crystals”.
 31. *(invited)* Stanford Energy and Environment Affiliates Program New Faculty Seminar, Stanford, CA, 7th April 2015, “Tackling big challenges using tiny crystals”.
 32. *(invited)* SLAC seminar series, Menlo Park, CA, 4th February 2015, “Tackling big challenges using tiny crystals”.
 33. *(invited)* Italian Chemical Society Annual Meeting, Università della Calabria, Cosenza, Italy, 9th September 2014, “Tackling big challenges using tiny nanocrystals”.
 34. *(invited)* Department of Mechanical and Process Engineering, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland, 15th April 2014, “Playing with Structures at the Nanoscale: Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
 35. *(invited)* Department of Chemical Engineering, Stanford University, Stanford (CA), 31st March 2014, “Playing with Structures at the Nanoscale: Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
 36. *(invited)* Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge (MA), 21st February 2014, “Playing with Structures at the Nanoscale: Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
 37. *(invited)* Department of Chemical and Biomolecular Engineering, University of Pennsylvania, Philadelphia (PA), 19th February 2014, “Playing with Structures at the Nanoscale: Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
 38. *(invited)* Department of Chemical Engineering, Lehigh University, Bethlehem (PA), 12th February 2014, “Playing with Structures at the Nanoscale: Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
 39. *(invited)* Department of Chemical Engineering and Materials Science, University of Minnesota-Twin Cities, Minneapolis (MN), 4th February 2014, “Playing with Structures at the Nanoscale:



- Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
40. *(invited)* Department of Chemical and Biological Engineering, University of Wisconsin-Madison, Madison (WI), 28th January 2014, “Playing with Structures at the Nanoscale: Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
 41. *(invited)* Department of Chemical and Biological Engineering, Princeton University, Princeton (NJ), 15th January 2014, “Playing with Structures at the Nanoscale: Rational Manipulation of Nanocrystals as Building Blocks in Catalysis and Energy”.
 42. *(contributed)* AIChE Annual Meeting, San Francisco, CA, 8th November 2013, “Exceptional Activity for Methane Oxidation With Catalysts Prepared By Modular Assembly of Subunits”.
 43. *(contributed)* AIChE Annual Meeting, San Francisco, CA, 6th November 2013, “Multiwalled Carbon Nanotubes Drive the Activity of Metal@Oxide Core-Shell Catalysts in Modular Nanocomposites”.
 44. *(contributed)* AIChE Annual Meeting, San Francisco, CA, 4th November 2013, “Nanoscale Engineering of the Metal-Support Interface Reveals Its Crucial Role in Ceria-Based Catalysts”.
 45. *(invited)* Workshop “Theory and practice of catalysis” Telluride, CO, 2nd August 2013, “Playing with structures at the nanoscale: designing catalysts by manipulation of the component building blocks”.
 46. *(invited)* *Lectio Magistralis* ENI Award, University of Bologna, Italy, 27th June 2013, “Tailored nanoarchitectures based on transition metals for heterogeneous catalysis”.
 47. *(invited)* Department of Chemical and Biomolecular Engineering, Rensselaer Polytechnic Institute (RPI), Troy, NY, 29th May 2013, “Playing with structures at the nanoscale: precise catalysts by manipulation of the composing building blocks”.
 48. *(contributed)* MRS Spring Meeting, San Francisco, CA, USA, 4th April 2013, "Exploring semiconductor-plasmonic interaction with well defined building blocks".
 49. *(invited)* The Catalysis Society of Metropolitan New York Spring Meeting, University of Princeton, 20th March 2013, “Exceptional activity for methane oxidation over catalysts prepared by modular assembly of subunits”.
 50. *(invited)* Department of Chemical and Biomolecular Engineering, University of Delaware, Newark, DE, 14th February 2013, “Tailored nanoarchitectures based on transition metals for heterogeneous catalysis”.
 51. *(invited)* National Conference of the Division of Inorganic Chemistry of the Italian Chemical Society, Sestri Levante (Italy), 13th September 2012, “Tailored nanoarchitectures based on transition metals for heterogeneous catalysis”.
 52. *(contributed)* 244th ACS National Meeting, Philadelphia, PA, USA, 20th August 2012, "Catalytic role of the metal-support interface in d⁸-ceria systems prepared using artificial atoms".
 53. *(invited)* ICTP-SISSA Workshop on New Materials for Renewable Energy, ICTP, Trieste, Italy, 18th October 2011, "Synthesis of dispersible core-shell metal@oxide materials and their application as stable fuel cell catalysts".
 54. *(invited)* Conference "Chemically synthesized nanoparticles and catalysis", Argonne National Lab (Argonne, IL, USA), 28th April 2011, "Synthesis of dispersible core-shell metal@oxide materials and their application as stable fuel cell catalysts".
 55. *(invited)* Universidad de Cadiz, Cadiz, Spain, 15th June 2010, "Embedded phases: a way to active and stable catalysts".
 56. *(invited)* Slovenian Conference on Materials and Technologies for Sustainable Growth,



University of Nova Gorica, Ajdovscina, Slovenia, May 12th 2009, "Metal-doped TiO₂ for hydrogen production".
