Raphael G. Raptis

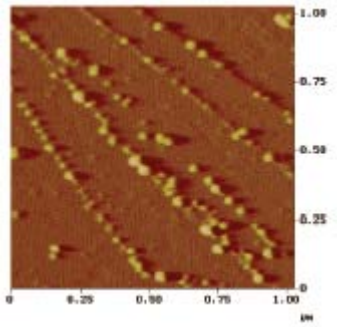
Inorganic Chemist

University of Puerto Rico, Río Piedras Campus

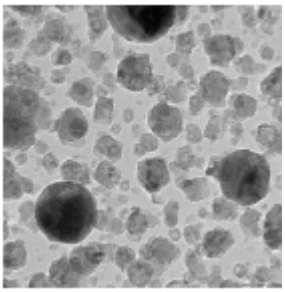
Biography

Raptis obtained his bachelor's degree in Chemistry from the Aristotle University of Thessaloniki in Greece, and his Ph.D. in Inorganic Chemistry from Texas A&M University. He joined the faculty of the Chemistry Department of the University of Puerto Rico, Rio Piedras Campus in 1998 after a postdoctoral appointment at the Australian National University in Canberra, Australia, and an Assistant Professorship at the University of Crete in Greece. His research in Puerto Rico, funded by the National Institutes of Health, the National Science Foundation, and NASA, is focused on the synthesis of novel metal complexes with unusual topologies, electron transfer and magnetic properties. The synthesis and study of a new class of iron-based MRI contrast agents has been a major theme of his recent work. These iron complexes can be appropriately modified as to target specific organs or tissues: targeting ovarian cancer cells is one of the group's current goals. Other work involves the preparation of molecular precursors for the controlled deposition of catalyst nanoparticles on solid supports. The study of porous metal-organic frameworks (MOFs) for the selective sorption of gases is a new direction currently pursued in Dr. Raptis' laboratory. The intellectual property of his work has been protected by two United States patents (two more applications are pending in the United States Patent and Trademark Office). Raptis and his group also operate the single crystal X-ray crystallographic facility of the Chemistry Department, which carries

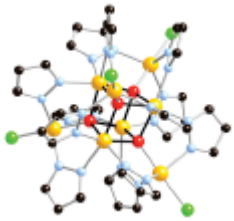
out structural studies of variety of small molecules prepared in their laboratory as well as in collaborating laboratories in Puerto Rico and elsewhere.



STM image of palladium nanoparticles.



TEM image of palladium-cobalt precursor.



An iron-based MRI contrast agent.

Teams

Cluster II: Functional Nanostructures at the Interface

Phone

+1-787-764-0000 ext. 2598

Fax

+1-787-756-8242

E-mail

Raphael@epscor.upr.edu

Education

- B.Sc. in Chemistry, Aristotle University of Thessaloniki
- Ph.D. in Inorganic Chemistry, Texas A&M University

Appointments

2004–present	Professor, University of Puerto Rico, San Juan, Puerto Rico, United States
1999–2004	Associate Professor, University of Puerto Rico, San Juan, Puerto Rico, United States
1998–1999	Assistant Professor, University of Puerto Rico, San Juan, Puerto Rico, United States
1997–1998	Visiting Professor, Univerity of Texas at El Paso, El Paso, Texas, United States
1993–1997	Assistant Professor, University of Crete, Heraklion, Crete, Greece

Publications

1. J. R. Martínez, R. G. Raptis, and G. Yang, "Dinuclear gold(III) pyrazolato complexes - Synthesis, structural characterization and transformation to their trinuclear gold(I) and gold(I/III) analogues", Inorganica Chimica Acta, 362, 1546 (2009)
2. E. Barouda, K. D. Demadis, R. G. Raptis, and H. Zhao, "Metal Tetraphosphonate “Wires” and Their Corrosion Inhibiting Passive Films", Inorganic Chemistry, 48, 819 (2009)
3. L. Arroyo-Ramirez, C. R. Cabrera, R. Montano-Serrano, and R. G. Raptis, "Nanostructural Formation of Pd-Co Bimetallic Complex on HOPG Surfaces: A XPS and AFM Study", Research Letters in Nanotechnology, (2009)
4. K. D. Demadis, M. Papadaki, R. G. Raptis, and H. Zhao, "2D and 3D alkaline earth metal carboxyphosphonate hybrids: Anti-corrosion coatings for metal surfaces", Journal of Solid State Chemistry, 181, 679 (2008)
5. P. Baran, I. Chakraborty, E. Fachini, R. G. Raptis, Y. Sanakis, and A. Simopoulos, "A Mixed-Valence Octanuclear Iron-Oxo Pyrazolate: Assessment of Electronic Delocalization by Structural and Spectroscopic Analysis", Inorganic Chemistry, 11734, 47 (2008)
6. K. D. Demadis, M. Papadaki, R. G. Raptis, and H. Zhao, "Corrugated, Sheet-Like Architectures in Layered Alkaline-Earth Metal R,S-Hydroxyphosphonoacetate Frameworks: Applications for Anti-Corrosion Protection of Metal Surfaces", Chemistry of Materials, 20, 4835 (2008)

7. P. Baran, G. I. Chilas, L. Cronin, T. A. Kabanos, E. J. McInnes, H. N. Miras, R. G. Raptis, M. P. Sigalas, and D. J. Stone, "Solution Discovery and Solid State Characterisation of a Heterometallic Polyoxometalate {Mo11V7}: [MoVI11VV5VIV2O52(μ9-SO3)]7-", Chemical Communications, 4703 (2008)
8. R. Herchel, H. N. Miras, S. Pérez, R. G. Raptis, C. Rinaldi, and H. Zhao, "Synthesis and characterization of linear trinuclear Pd, Co and Pd/Co pyrazolate complexes", European Journal of Inorganic Chemistry, 4745, 30 (2008)

Grants

1. O. Auciello, C. R. Cabrera, M. J. Guinel, Y. Ishikawa, J. Jellinek, M. Jose-Yacamán, G. Morell, R. G. Raptis, and G. Sandi. FUNDAMENTAL SCIENCE OF NANOSTRUCTURED ELECTROCATALYSTS/ DIAMOND SUPPORTS FOR FUEL CELL APPLICATIONS, United States Department of Energy, Hydrogen, 3 years, October 2009, Single PI, Pending, $3,900,000.
2. A. J. Hernández, Y. Ishikawa, B. Luna, G. Morell, and R. G. Raptis. A Combined Experimental and Theoretical Approach for the Development of Selective Nanoporous Gas Sorbents for the Effective Restoration of Breathing Air in Crewed Space Craft, National Aeronautics and Space Administration, EPSCoR, 3 years, October 2009, Multiple PIs, Pending, $1,350,000.
3. J. Klostergaard and R. G. Raptis. Synthesis and Pre-Clinical Evaluation of Targeted, Iron-Based Contrast Agents to Enhance Ovarian Cancer Detection and Treatment Scheduling, National Institutes of Health, U54, 3 years, October 2008, Multiple PIs, Approved, $360,000.
4. F. M. Aliev, C. R. Cabrera, L. F. Fonseca, K. H. Griebenow, A. J. Hernández, Y. Ishikawa, R. S. Katiyar, M. M. Martínez, A. R. Mayol, G. Morell, W. Otaño, R. G. Raptis, and B. R. Weiner. Center for Advanced Nanoscale Materials (CANM) NASA University Research, National Aeronautics and Space Administration, URC, 5 years, October 2008, Multiple PIs, Approved, $6,000,000.
5. N. Cardona, A. J. Hernández, P. Kohl, A. M. Padovani, O. J. Perales, R. G. Raptis, C. Rinaldi, J. Santos, N. Sepúlveda, G. Serrano, D. Suleiman, O. M. Suárez, and M. Torres. Nanotechnology Center for Biomedical and Energy Driven Systems and Applications (NCBEDSA), National Science Foundation, CREST, 5 years, September 2008, Multiple PIs, Approved, $5,000,000.
6. R. G. Raptis. A Combined Experimetal and Theoretical Study of Redox-Active Fe4O4-Cubanes, National Science Foundation, International Collaboration in Chemistry, 3 years, August 2008, Single PI, Approved, $390,000.
7. R. G. Raptis. Mössbauer Spectroscopic Studies of Redox-Active Fe4O4 Cubanes, National Science Foundation, Chemistry, 2 years, July 2008, Single PI, Approved, $11,100.
8. C. R. Cabrera, Y. Ishikawa, R. S. Katiyar, G. Morell, and R. G. Raptis. Space Exploration Enabling Power Systems: Partnership to Develop the Fundamental Science at UPR and Perform the Corresponding Proof-of-Concept at NASA GRC, National Aeronautics and Space Administration, EPSCoR, 3 years, October 2007, Multiple PIs, Approved, $1,350,000.

Presentations

1. R. G. Raptis (March 2009) "Polynuclear Iron-Oxo-Pyrazolate Clusters; Possible Metalloprotein Models and MRI Contrast Agents" in University of Kentucky.
2. R. G. Raptis (March 2009) "Polynuclear Iron-Oxo-Pyrazolate Clusters; Possible Metalloprotein Models and MRI Contrast Agents" in University of Louisville.
3. R. G. Raptis (March 2009) "Trinuclear and hexanuclear mixed-valent Cu-pyrazolato complexes" in 2nd Zing Conference on Coordination Chemistry.
4. L. Arroyo-Ramirez, C. R. Cabrera, and R. G. Raptis (March 2009) "Palladium-Cobalt Precursor for Catalyst Formation on Carbon Surfaces" in 29th Puerto Rico Interdisciplinary Scientific Meeting (PRISM 2009).
5. L. Arroyo-Ramirez, C. R. Cabrera, and R. G. Raptis (January 2009) "Palladium-Cobalt Nanoparticles on Carbon Surfaces: An Electrochemical and Surfaces Analysis" in NASA Space Grant Southeast Regional Meeting.
6. R. G. Raptis (October 2008) "Polynuclear Iron-Oxo-Pyrazolate Clusters; Possible Metalloprotein Models and MRI Contrast Agents".
7. L. Arroyo-Ramirez, C. R. Cabrera, and R. G. Raptis (October 2008) "Palladium-Cobalt Precursor for Catalyst Formation on Carbon Surfaces" in PRiME 2008.
8. R. G. Raptis (September 2008) "Redox-Active Fe4O4 Cubanes" in Current Trends in Nanoscopic and Mesoscopic Magnetism.
9. L. Arroyo-Ramirez, C. R. Cabrera, and R. G. Raptis (August 2008) "Palladium-Cobalt Nanoparticles on Carbon Surfaces: An Electrochemical and Surfaces Analysis" in IFN External Advisory Board Meeting.
10. L. Arroyo-Ramirez, C. R. Cabrera, and R. G. Raptis (July 2008) "Palladium-Cobalt Nanoparticles on Carbon Surfaces: An Electrochemical and Surfaces Analysis" in XXVIII Latin American Chemical Congress.