

Julie COSMIDIS, Ph.D.

Department of Geosciences, Pennsylvania State University
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Professional Experience

- July 2017-Present **Assistant Professor**, Department of Geosciences, Pennsylvania State University
- Jan 2014 – Dec 2016 **Research Associate**, Geomicrobiology Laboratory, Department of Geological Sciences, University of Colorado, Boulder

Education

- 2010-2013 **Ph.D. in Geochemistry, Institut de Minéralogie, de Physique des Matériaux et de Cosmochimie (IMPMC) and Institut de Physique du Globe de Paris (IPGP)**
Title: “Bacterial biomineralization of modern and fossil calcium- and iron-phosphates”
Advisors: Dr. Karim Benzerara, Prof. François Guyot
- 2009 –2010 **Master degree in Earth Sciences, Institut de Physique du Globe de Paris (IPGP) and Université Paris Diderot (Paris 7)**
Specialization: Geochemistry
- 2008-2009 **Agrégation in Life and Earth Sciences**
Ranked 7th in the national competition for the French higher public education system recruitment
- 2006-2008 **Bachelor degree in Earth Sciences, Ecole Normale Supérieure (ENS) de Lyon**
Specialization: Geochemistry and Geophysics

Research Experience

- May-July 2008 **Institut de Physique du Globe de Paris (IPGP)**
Advisor: Dr. Mark Wieczorek
- Jan-March 2008 **Ecole Normale Supérieure de Lyon (ENS)**
Advisor: Dr. Ghilaine Quitté
- June-July 2007 **Lunar and Planetary Institute, Houston, Texas**
Advisor: Dr. Essam Heggy

Awards

2014 **Prix Haüy-Lacroix** for the best doctoral thesis in Mineralogy, Geochemistry and Material Sciences received from the French Society of Mineralogy and Crystallography (SFMC) and the French Geological Society (SGF)

Grants and Other Funding Awards

2015 **Colorado Advanced Industries Accelerator Program** (\$80,000), “Multidimensional sulfur-carbon networks for optimized cathodes in next-generation Li-S batteries”, Co-PI with Prof. Alexis Templeton

2012, 2013 **Institut National des Sciences de l’Univers, French National Center for Scientific Research** (€13,860), “Calcium-phosphate biomineralization by microbial phosphatase enzymes: study of modern and ancient samples”, Project co-written with Elodie Duprat and Karim Benzerara (PIs)

2011 **Student travel grant, French Society of Mineralogy and Crystallography** (to the International School on Minerals and Biosphere, Campliglia Marittima, Italy)

Teaching and Mentoring

2010-2013 Teaching Assistant, Université Paris Diderot (Paris 7), Tutorials in Geobiology – Graduate level

2010-2013 Teaching Assistant, Université Paris Diderot (Paris 7), Practical works in Aqueous Geochemistry – Undergraduate level

2010-2012 Mentored four graduate students for research projects in Geomicrobiology

Service

Peer reviews for: *Geology, Geobiology, ISME Journal, Precambrian Research, Nature Scientific Reports, Colloids and Surfaces B: Biointerfaces, and Annales Societatis Geologorum Poloniae, Minerals, The Science of Nature, Nature Communications*

2015 **Session convenor, Goldschmidt Conference, Prague, Czech Republic** “Phosphorus biogeochemistry in past and present environments”

Public Outreach

2010-2013 **Fête de la Science, Paris, France (annual event)**
Organization of scientific experiments and discussions with primary school students

Patents

Cosmidis J and Templeton A, “Novel Sulfur-Carbon Tubes and/or Spheres, and Methods of Making Same”, US Patent and Trademark Office Provisional Application No. 62/205,960, filed on August 17, 2015.

Publications

Lau G, **Cosmidis J**, Grasby S, Trivedi C, Spear J, Templeton A, Low-temperature formation and stabilization of rare allotropes of cyclooctasulfur (β -S₈ and γ -S₈) in the presence of organic carbon at a sulfur-rich glacial site in the Canadian High Arctic, *Geochimica et Cosmochimica Acta*, 200, 218–231 (2017)

Cosmidis J, Templeton A, Self-assembly of biomorphic carbon/sulfur microstructures in sulfidic environments, *Nature Communications*, 7, 12812 (2016)

Li J, Margaret-Oliver I, Cam N, Boudier T, Blondeau M, Leroy E, **Cosmidis J**, Skouri-Panet F, Guigner J-M, Ferard C, Poinot M, Moreira D, Lopez-Garcia P, Cassier-Chauvat C, Chauvat F, Benzerara K, Biomineralization patterns of intracellular carbonatogenesis in cyanobacteria: Molecular hypotheses, *Minerals*, 6:1, 10 (2016)

Cosmidis J, Benzerara K, Guyot F, Skouri-Panet F, Duprat E, Férard C, Guigner J-M, Babonneau F, Coehlo C, Calcium-phosphate biomineralization induced by alkaline phosphatase activity in *Escherichia coli*: localization, kinetics and potential signatures in the fossil record, *Frontiers in Earth Science*, 3, 84 (2015)

Jain R, Seder-Colomina M, Jordan N, Dessi P, **Cosmidis J**, van Hullebusch E, Weiss S, Farges F, Lens P, Entrapped elemental selenium nanoparticles affect physicochemical properties of selenium fed activated sludge, *Journal of hazardous materials*, 295, 193–200 (2015)

Zatoń M, Niedźwiedzki G, Marynowski L, Benzerara K, Pott C, **Cosmidis J**, Krzykowski T, Filipiak P, Coprolites of Late Triassic carnivorous vertebrates from Poland: An integrative approach, *Palaeogeography Palaeoclimatology Palaeoecology*, 430, 21–46 (2015)

Cosmidis J, Benzerara K, Nassif N, Tyliszczak T, Bourdelle F, Characterization of Ca-phosphate biological materials by Scanning Transmission X-ray Microscopy (STXM) at the Ca L_{2,3}-, P L_{2,3}- and C K-edges, *Acta Biomaterialia*, 12, 260–269 (2015)

Li J, Bernard S, Benzerara K, Beyssac O, Allard T, **Cosmidis J**, Moussou J, Impact of biomineralization on the preservation of microorganisms during fossilization: An experimental perspective, *Earth and Planetary Science Letters*, 400, 113–122 (2014)

Benzerara K, Skouri-Panet F, Li J, Ferard C, Gugger M, Laurent T, Couradeau E, Ragon M, **Cosmidis J**, Menguy N, Margaret-Oliver I, Tavera R, Lopez-Garcia P, Moreira D, Intracellular Ca-carbonate biomineralization is widespread in cyanobacteria, *Proceedings of the National Academy of Sciences*, 111, 10933–10938 (2014).

Cosmidis J, Benzerara K, Morin G, Busigny V, Jézéquel D, et al., Biomineralization of iron phosphates in the anoxic water column of Lake Pavin (Massif Central, France), *Geochemica et Cosmochemica Acta*, 126:78–96 (2014).

Cosmidis J, Benzerara K, Menguy N, Arning E, Microscopy evidence of bacterial microfossils in phosphorite crusts of the Peruvian shelf: implications for phosphogenesis mechanisms, *Chemical Geology*, 359, 10–22 (2013)

Baumgartner J, Morin G, Menguy N, Perez Gonzalez T, Widdrat M, **Cosmidis J**, Faivre D, Magnetotactic bacteria form magnetite from a phosphate-rich ferric hydroxide via nanometric ferric (hydr)oxide intermediates, *Proceedings of the National Academy of Sciences*, 110, 14883–14888 (2013)

Bourdelle F, Benzerara K, Beyssac O, **Cosmidis J**, Neuville D R, Brown G E Jr., Paineau E, Quantification of the ferric/ferrous iron ratio in silicates by scanning transmission X-ray microscopy at the Fe L_{2,3} edges, *Contributions to Mineralogy and Petrology*, 166, 423–434 (2013)

Cosmidis J, Benzerara K, Gheerbrant E, Estève I, Bouya B and Amaghazaz M, Nanometer scale characterization of exceptionally preserved bacterial fossils in Paleocene phosphorites from Ouled Abdoun (Morocco), *Geobiology*, 11:2, 139–153 (2013)

Book Chapters

Busigny V, Jézéquel D, **Cosmidis J**, Viollier E, Benzerara K, Planavsky N, Albéric P, Lebeau O, Sarazin G and Michard G, The Iron Wheel in Lac Pavin: Interaction with Phosphorus Cycle. In: *Lake Pavin: History, biogeochemistry, and sedimentology of a deep meromictic maar lake*, T Sime-Ngando, P Boivin, E Chapron, D Jezequel, and M Meybeck (eds.), Springer International Publishing, pp. 205–220 (2016)

Cosmidis J, Benzerara K, Soft X-ray Scanning Transmission Micro-Spectroscopy, In: *Biom mineralization Sourcebook: Characterization of Biominerals and Biomimetic Materials*, Laurie Gower and Elaine DiMasi (eds.), Taylor and Francis, London, pp. 115–133 (2014)

Submitted papers

Duprat E, Skouri-Panet F, **Cosmidis J**, Benzerara K, *In vitro* and *in silico* evidence of phosphatase diversity in the biomineralizing bacterium *Ramlibacter tataouinensis*. *Submitted to Environmental Microbiology and Environmental Microbiology Reports*

In preparation

Cosmidis J, Templeton A, Elemental sulfur organomineralization and its environmental signatures. *In prep.*

Selected Conference Abstracts

Johnson J, Rasmussen B, Muhling J, Benzerara K, Jézéquel D, **Cosmidis J**, Templeton A. Exploring Iron Silicate Precursors of Ancient Iron Formations through Rock Record, Laboratory and Field Analogue Investigations. American Geophysical Union Fall Meeting, San Francisco, December 2016.

Benzerara K, Cam N, **Cosmidis J**, Duprat E, Garcia-Lopez P, Moreira D, Saghai A, Skouri-Panet F, Zeyen N. Microbial calcification in the rock record: learning from field- and laboratory-based studies down to the nm-scale. Goldschmidt Conference, Yokohama, Japan, June 2016.

Cosmidis J, Templeton A. A novel elemental sulfur biomineralization mechanism. Goldschmidt Conference, Prague, Czech Republic, August 2015.

Templeton A, Lau G, **Cosmidis J**, Trivedi C, Spear J, Grasby S. Sulfur oxidation and biomineralization processes in sulfidic ice ecosystems. Goldschmidt Conference, Prague, Czech Republic, August 2015.

Benzerara K, **Cosmidis J**, Miot J, Bourdelle F, Swaraj S. Spectromicroscopy study of mineral-microbe interactions by soft x-ray scanning transmission x-ray microscopy. 9^{ème} édition des Journées de l'EELS, Roscoff, France, June 2014.

Morin G, Adra A, **Cosmidis J**, Dublet G, Maillot F, Noël V, Benzerara K, Fritsch E, Juillot F, Ona-Nguema G. Structure and reactivity of iron minerals in the environment. ENVIronmEnt at SOLEIL 2014, Soleil Synchrotron, Saint Aubin, France, May 2014.

Cosmidis J, Benzerara K, Morin G, Busigny V, Jézéquel D, et al. Bacterial formation of Fe-phosphates in the water column of meromictic ferruginous Lake Pavin (Massif Central, France). Goldschmidt Conference, Florence, Italy, August 2013.

Cosmidis J, Benzerara K, Morin G, Busigny V, Jézéquel D, et al. Bulk EXAFS And STXM Study Of Bacterially Formed Fe-Phosphates In The Water Column Of the Meromictic Lake Pavin (Massif Central, France). Soleil User Meeting, Soleil Synchrotron, Saint Aubin, France, January 2013.

Benzerara K, **Cosmidis J**, Li JH Sr, Miot J, Couradeau E. Biomineralization and Fossilization of Bacteria: what do we learn from field and experimental studies? GSA annual meeting, Charlotte, USA, November 2012.

Cosmidis J, Benzerara K, Estève I, Gheerbrant E. Nanometer Scale Characterization of Fossil Bacteria in a Paleocene Phosphorite Sample. Goldschmidt Conference, Montreal, Canada, June 2012.

Benzerara K, Beyssac O, Galvez M, Bernard S, **Cosmidis J**. An Experimentalist Call to Theoreticians About XANES Spectra Theoretical Simulation at the C K-Edge, Ca and Fe L_{2,3} Edges. Goldschmidt Conference, Prague, Czech Republic, August 2011.

Heggy E, **Cosmidis J**, Clifford SM. Parametric Dielectric Map of the Martian North Polar Layered Deposits in Support of the MARSIS and SHARAD data analysis. AGU Fall Meeting, San Francisco, CA, December 2007.