

## PROFESSIONAL SUMMARY

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Dr. Ola Opara is an R&D and process engineer with nearly a decade of experience in industrial water treatment. Dr. Opara is a Vice President at Inotec, where she directs the Bioprocess Development Laboratory, which focuses on treatability testing and technology development/implementation of water treatment processes in the mining and power industries.

She was instrumental in development and testing of an Electro-Biochemical Reactor technology, from bench and pilot-scale tests to a full-scale implementation. Her testing, management, and engineering experience concentrates in the United States and Canada, with several other projects in Central and South America, Europe, and Africa.

Dr. Opara's experience includes treatment evaluations and troubleshooting of biological, chemical coagulation/precipitation, and RO membrane systems for active, passive, and in-situ water treatment applications. Much of her work over the past five years involved chemistry and microbial assessments of water and site materials; developing laboratory protocols and unique techniques; and designing, implementing, and managing treatment processes. She has worked with a variety of clients, including large gold, coal, and base-metals mining corporations, smaller mining outfits, as well as state DEQ offices and the EPA.

Dr. Opara is responsible for projects' resource and budget planning, keeping projects on time and on schedule, and providing project deliverables. She prepares project proposals, client reports, and presents research findings at professional meetings/conferences and in scientific and trade journals.

Dr. Opara completed her M.Sc. and Ph.D. degrees in Environmental Engineering from the Department of Metallurgical Engineering and the Department of Civil and Environmental Engineering, University of Utah. She currently holds an Adjunct Assistant Professor position at the University of Utah, where she teaches coursework on energy resources, water issues, and sustainability.

## EXPERIENCE

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<b>Vice President and Principal</b> INOTEC, Salt Lake City, Utah	April 2015 – Present
<b>Adjunct Assistant Professor</b> University of Utah, <i>Department of Geography</i> , Salt Lake City, Utah	July 2014 – Present
<b>Principal and R&amp;D Manager</b> INOTEC, Salt Lake City, Utah	May 2012 – April 2015
<b>Scientist/Engineer/Laboratory Manager</b> INOTEC, Salt Lake City, Utah	May 2011 – May 2012
<b>Post-Doctoral Fellow</b> University of Utah, <i>Department of Metallurgical Engineering</i> , Salt Lake City, Utah	May 2012 – May 2013

**Graduate Research Assistant** September 2007 – May 2012  
**University of Utah**, *Department of Metallurgical Engineering*, Salt Lake City, Utah

**Teaching Assistant** January 2008 – May 2012  
**University of Utah**, Salt Lake City, Utah

**Environmental Engineering Intern** May – August 2009  
**Newmont Mining Corporation**, Englewood, Colorado

**Research Assistant** February – September  
2007  
**Gdansk University of Technology**, Gdansk, Poland

## SELECTED PROJECTS

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**The Landusky Mine Biotreatment System: Evaluation and Conversion of a Conventional Anaerobic Bioreactor into a new Electro-Biochemical Reactor (EBR) Technology.**

March 2012 – Present  
**Spectrum Engineering** and **The State of Montana**, USA

**Removal of Metals from Flotation-Influenced Mining Wastewater using the EBR Technology.**

June 2011 – June 2014  
**Confidential Mining Client**, Canada

**Laboratory Evaluation of In-Situ and Active Treatment Technologies for Metals Removal from ARD Mine Drainage Waters.**

April 2013 – May 2014  
**Confidential Mining Client**, USA

**In-Situ Denitrification and Selenium Stabilization in Waste Coal Materials.**

April 2013 – May 2014  
**Confidential Coal Mining Client**, Canada

**Biological Nitrate Removal from RO Reject Waters.**

January 2013 – September 2013  
**Confidential Mining Client**, USA/Peru

**Sulfate Removal from Gold Mining Waters using the EBR Technology.**

February 2013 – November 2013  
**Confidential Mining Client**, USA/Ghana

**Selenium and Nitrate Removal from Coal Mining Waters using the EBR Technology.**

August 2012 – May 2013  
**Multiple Confidential Mining Clients**, Canada

**Investigation of Excessive Cyanide Degradation Causes in a Gold Heap Leaching Operation.**

January 2012 – April 2012  
**Confidential Mining Client**, USA

## EDUCATION

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### Environmental Engineering, PhD

University of Utah, Department of Civil and Env. Engineering, Salt Lake City, Utah May 2010 – August 2012  
Dissertation: *Biochemically Enhanced Methane Production from Coal*

### Environmental Engineering, Master of Science

University of Utah, Department of Metallurgical Engineering, Salt Lake City, Utah September 2007 – May 2010  
Thesis: *Membrane Fractionation of Cyanide Complexes*

### Environmental Protection and Management, Bachelor of Science

Gdansk University of Technology, Department of Chem. Tech., Gdansk, Poland October 2003 – February 2007  
Thesis: *Chemistry and Technology of Methane Hydrates*

## SELECTED PUBLICATIONS/PRESENTATIONS

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1. Opara, O.; Fudyma, J.; Bowden, J.; Adams, J. Sulfate and Nitrate Removal from Mining Wastewaters using the Electro-Biochemical Reactor (EBR) Technology. 25<sup>th</sup> Annual Mine Design, Operations & Closure Conference, May **2017**, Fairmont, MT.
2. Opara, O.; Fudyma, J.; Bowden, J.; Adams, J. Successful Application of Synergistic Active and In Situ Treatment Combinations. 24<sup>th</sup> Annual Mine Design, Operations & Closure Conference, May **2016**, Fairmont, MT.
3. Opara, A.O.; Fudyma, J.; Adams, D.J. Selenium Removal from Flue Gas Desulfurization Wastewaters with the Electro-Biochemical Reactor Technology. 19<sup>th</sup> North American Metals Council – Selenium Working Group Meeting. November **2015**, Salt Lake City, UT.
4. Peoples, M.; Opara, A.; Adams, D.J. Treatment of Leach Pad Waters at the Landusky Mine. 23<sup>rd</sup> Annual Mine Design, Operations & Closure Conference, May **2015**, Fairmont, MT.
5. Opara, A.; Peoples, M.; Adams, D.J. The Landusky Mine: Conversion of an Existing Biotreatment System into an Electro-Biochemical Reactor for Removal of Metals and Inorganics. 27<sup>th</sup> Annual Environmental and Ground Water Quality Conference. March **2015**, Pierre, SD.
6. Enegeess, D.; Bohner, A.; Webster, T.; Opara, A.O.; Adams, J. New Techniques to Reduce Long-Term Operations Costs of Biological Systems Removing Oxyanions in Water Treatment Operations. 75<sup>th</sup> Annual International Water Conference. November **2014**, San Antonio, TX.
7. Opara, A.; Peoples, M.J.; Adams, D.J.; Martin, A. Electro-Biochemical Reactor (EBR) Technology for Selenium Removal from British Columbia's Coal Mining Wastewaters. *Minerals & Metallurgical Processing*, **2014**, Vol. 31, No. 4, pp. 209-214.
8. Opara, A. *Electro-Biochemical Reactor Water Treatment Technology Demonstrates Low Selenium and Other Metal Effluents in Hardrock Mining Wastewaters*. The National Conference on Mining-Influenced Waters, the U.S. Environmental Protection Agency, Albuquerque, NM, August **2014**.
9. Opara, A.; Peoples, M.J.; Adams, D.J.; Maehl, W. *The Landusky Mine Biotreatment System: Comparison of Conventional Bioreactor Performance with a New Electro-Biochemical Reactor (EBR) Technology*. Society for Mining, Metallurgy and Exploration International Conference, Salt Lake City, UT, February **2014**.

10. Adams, D.J.; Clark, J.P.; Opara, A.; Peoples, M.J. *Discussion of Regulatory Compliance Strategies to Achieve Receiving Water Quality Standards Using Selenium Reduction/Removal Options*, British Columbia Mine Reclamation Symposium, September, **2013**.
11. Opara, A.; Peoples, M.; Adams, D.J. *Site-specific Electro-Biochemical Systems: Bench- to Pilot- to Full-scale Selenium Removal*. The 53rd Annual Conference of the Pacific Northwest International Section of the Air & Waste Management Association, Vancouver Island, October **2013**.
12. Adams, D.J.; Peoples, M.; Opara, A. *Site-specific Electro-Biochemical Systems to meet Real World Selenium and other Contaminant Treatment Challenges*. North American Metals Council - Selenium Working Group, Vancouver, BC, Canada, June **2013**.
13. Adams, D.J.; Peoples, M.; Opara, A. *Electro-Biochemical Reactor (EBR) Taking Proven Bioprocesses to the Next Level of Performance and Cost Effectiveness*. British Columbia Ministry of Environment, Victoria, BC, Canada, May **2013**.
14. Opara, A. *Biochemically Enhanced Methane Production from Coal*. Ph.D. dissertation, University of Utah, **2012**.
15. Opara, A.; Adams, D.J.; Free, M.L.; McLennan, J.; Hamilton, J. *Microbial Production of Methane and Carbon Dioxide from Lignite, Coal, and Coal Waste Materials*. *International Journal of Coal Geology*, **2012**, 96-97, 1-8.
16. Adams, D.J.; Peoples, M.J.; Opara, A. *A New Electro-Biochemical Reactor (EBR) for Treatment of Wastewaters*. Society for Mining, Metallurgy and Exploration International Conference, Seattle, WA, **2012**.
17. Yin, X.; Opara, A.; Du, H.; Miller, J.D. *Molecular dynamics simulations of metal–cyanide complexes: Fundamental considerations in gold hydrometallurgy*. *Hydrometallurgy*, **2011**, 106, 64–70.
18. Opara, A. *Membrane Separation of Cyanide Species*. M.Sc. thesis, University of Utah, Salt Lake City, **2010**.