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Professor Lynne Macaskie

Professor of Applied Microbiology

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About

Lynne Macaskie has been working for more than 25 years on applications of microorganisms in various areas of Biotechnology for the Environment. Her interests range from bioremediation of xenobiotics and heavy metals through to nuclear waste treatment and biomineral encapsulation and barrier agents for this.

Over the last 15 years she has moved into hydrogen biotechnology fuel cells for clean power generation and biomanufacture of metallic catalysts for green chemistry applications. Biorecovery of strategic and precious metals from wastes dovetails into the biorefining of such recovered materials into new catalysts.

Qualifications

BSc Microbiology, University of London (1974)

PhD Biochemistry, University of London (1977)

Biography

1977-1979: Broodbank Fellow at University of Cambridge (Food spoilage microbiology)

1979-1986: Postdoctoral fellow at University of Oxford, Physical Chemistry Laboratory (Microbe-metal interactions and metal recovery)

1986-1991: Departmental Demonstrator in Department of Biochemistry, University of Oxford and BTP Fellow, Pembroke College Oxford from 1988-1991 (Bioprocess development)

1991-date: University of Birmingham Lecturer in Biotechnology 1991, Personal Chair 2003.

Teaching

From 1991- 2001 Lynne Macaskie led various modules in Applied Microbiology and Biotechnology and she left undergraduate teaching in 2002 to take up various industrial fellowships.

Postgraduate supervision

PhD projects are available in all the areas outlined above. See also: **www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Macaskie (http://www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Macaskie)**

Research

Research Theme within School of Biosciences: **Institute of Microbiology and Infection (/research/activity/microbiology-infection/index.aspx)**

Microbial bioremediation of nuclear and industrial wastes

Lynne Macaskie has been working for more than 25 years on applications of microorganisms in various areas of Biotechnology for the Environment. Her interests range from bioremediation of xenobiotics and heavy metals through to nuclear waste treatment and biomineral encapsulation and barrier agents for this. Recently she has focused on the biorecovery of precious metals from wastes and biofabrication of nanocatalysts for energy and green chemistry applications.

She is also working on hydrogen biotechnology with a goal to deliver clean electricity from agri-food wastes and precious metal wastes together, using the same bacteria for both functions to ‘close the loop’ and forestall waste production. Recently she has moved into capture of waste carbon dioxide from hydrogen production processes, by conversion of the waste CO_2 into high value products.

The goal is an integrated biorefinery where wastes from each stage of the process are used as valuable raw materials for other stages.

The four pillars of Lynne's research are:

- **Biological hydrogen production (/research/activity/bio-hydrogen/index.aspx)**
- Nuclear waste reprocessing
- Precious metal recovery
- Bionanocatalysts manufacture

Publications

See Lynne's Google Scholar profile (http://scholar.google.co.uk/citations?user=PpOjd44AAAAJ)

Bionanocatalysts and Green Chemistry

Wood J, Bodenes L, Bennett JA, Deplanche K, **Macaskie LE** (2010) Hydrogenation of 2-butyne-1,4-diol using novel nio-palladium catalysts *Ind & Eng Chem Res* in press (Feb 2010)

Bennett JA, Creamer NJ, Deplanche K, **Macaskie LE**, et al (2009) Palladium supported on bacterial biomass as a novel heterogeneous catalyst: a comparison of Pd/Al2O3 and bio-Pd in the hydrogenation of 2-pentyne *Chem Eng Sci* in press doi:10.1016/j.ces.2009.06.069

Mikheenko IP, Bennett JA, Shannon IJ, Wood J, **Macaskie LE** (2009) Biomineralised palladium is an effective hydrogenation catalyst. *Adv Mats Res* **71-73**, 725-728.

Macaskie LE, Deplanche K (2008) Catalytic activity of biomanufactured Au nanocatyalysts in selective oxidation of glycerol *J. Biotech* **S136**, S375.

Creamer NJ, Deplanche K, Snape TJ, **Macaskie LE** (2008). A biogenic catalyst for hydrogenation, reduction and selective dehalogenation in non-aqueous solvents *Hydrometallurgy* 94, 138-143

Creamer NJ, Mikheenko IP, Yong P, Deplanche K, Sanyahumbi D, Wood J, Pollmann K, Merroun M, Selenska-Pobell S, **Macaskie LE** (2007) Novel Pd hydrogenation bionanocatalyst for hybrid homogeneous/heterogeneous catalysis. *Catalysis Today* **128**, 80-90

Creamer NJ, Mikheenko IP, Deplanche K, Yong P, Wood J, Pollmann K, Selenska-Pobell S, **Macaskie LE**. 2007. A novel hydrogenation and hydrogenolysis catalyst using palladized biomass of Gram negative and Gram positive bacteria. *Adv Mats Res* **21-21** 603-606.

Bionanocatalysts and environment/remediation

Deplanche K, Snape TJ, Hazrati S, Harrad, S, **Macaskie LE** (2009) Versatility of a new bioinorganic catalyst: palladized cells of *Desulfovibrio desulfuricans* and application to dehalogenation of flame retardant materials. *Environ Technol* **30**, 681-692.

Humphries AC, Penfold DW, **Macaskie LE** (2007) Cr(VI) reduction by bio- and bioinorganic catalysis via use of bio-H_2: a sustainable approach for remediation of wastes *Journal of Chemical Technology and Biotechnology* **82**, 182-189.

Harrad S, Robson M, Hazrati S, Baxter-Plant VS, Deplanche K, Redwood MD, **Macaskie LE** (2007) Dehalogention of polychlorinated biphenyls and polybrominated diphenyl ethers using a hybrid bioinorganic catalyst. *Journal of Environmental Monitoring* **9**, 314-318.

Humphries AC, Mikheenko IP, **Macaskie LE** (2006) Cr(VI) reduction by immobilized palladized sulfate-reducing bacteria *Biotech Bioeng* **94**, 81-90

Mabbett AN, Yong P, Farr JPG, Macaskie LE (2004) Reduction of Cr(VI) by palladized biomass of *Desulfovibrio desulfuricans* ATCC 29577 *Biotechnology and Bioengineering* **87**, 104-109.

Humphries AC, Nott KP, Hall LD, **Macaskie LE** (2004) Continuous removal of Cr(VI) from aqueous solution catalysed by palladised biomass of *Desulfovibrio vulgaris Biotechnol Letts* **26**, 1529-1532.

Mabbett NA, **Macaskie LE et al** (2004) Reduction of Pd by palladized biomass of *Desulfovibrio desulfuricans Biotechnol Bioeng* **87**, 104-109.

Baxter-Plant VS, Mikheenko IP, **Macaskie LE** (2003) Sulphate-reducing bacteria, palladium and the reductive dehalogenation of chlorinated aromatic compounds *Biodegradation* **14**, 83-90

Mabbett AN **Macaskie, L.E et al** (2001). Effective reduction & removal of chlorophenol by hybrid bioinorganic catalytic processes. In *Biohydrometallurgy: Fundamentals, Technology and Sustainable Development* Eds V.S.T. Ciminelli & O Garcia, Elsevier, pp 335-342..

Fuel cells

Yong P, Mikheenko IP, Deplanche K, Sargent F, **Macaskie LE** (2009) Biorecovery of precious metals from wastes and conversion into fuel cells for electricity production *Adv Mats Res* **71-73**, 729-732.

De Carvalho RP, Yong P, Mikheenko IP, Paterson-Beedle M, **Macaskie LE** (2009) Electron paramagnetic resonance of active bio-Pd-based electrodes for fuel cells *Adv Mats Res* **71-73**, 737-740.

Yong P, Mikheenko IP, **Macaskie LE** (2008) Manufacturing of fuel cells by bio-crystallization *J Biotechnol* **136S** S374-S375

Yong P, Mikheenko IP, Paterson-Beedle M, **Macaskie LE** (2007) From biomineralization to fuel cells: biomanufacture of Pt and Pd nanocrystals for fuel cell electrode catalysts *Biotechnology Letters* **29**, 539-544.

Yong P, Mikheenko IP, **Macaskie LE** (2007) Novel fuel cell catalyst for clean energy production based on a bionanocatalyst. *Adv Mats Res* **20-21**, 655-658.

Precious metal removal/recovery and new nanocatalyst formulations from wastes

Deplanche K, Woods RD, Mikheenko I, Sockett RE, **Macaskie LE** (2008) Manufacture of stable palladium and gold nanoparticles on native and genetically engineered flagella scaffolds *Biotechnol Bioeng*, **101**, 873-880

Deplanche K, **Macaskie LE** (2008) Biorecovery of gold by *Escherichia coli* and *Desulfovibrio desulfuricans Biotech Bioeng* **99**, 1055-1064

Deplanche K Attard GA **Macaskie LE** (2007) Biorecovery of gold from jewellery waste by *Escherichia coli* and biomanufacture of catalytically active Au-material *Adv Mater Res* **20-21** 647-650.

Redwood MD, Deplanche K, Baxter-Plant VS, **Macaskie LE** (2008) Biomass-supported catalysts on *Desulfovibrio desulfuricans* and *Rhodobacter sphaeroides Biotechnol Bioeng* **99**, 1045-1054.

Macaskie LE, Creamer NJ, Essa AMM, Brown NL (2007) A new approach for the recovery of precious metals from solution and from leachates derived from electronic scrap *Biotechnology and Bioengineering* **96,** 631-639.

Murray AJ, Macaskie LE et al (2007). Biorecovery of platinum group metals from secondary sources *Adv Mats Res* **21-21**, 651-654.

Deplanche K, Attard GA, Macaskie LE (2007).Biorecovery of gold from jewellery wastes by *Escherichia coli* and biomanufacture of active Au-nanomaterial. Adv Mats Res **21-21**, 647-650

Mabbett AN, Sanyahumbi D., Yong P., **Macaskie LE** (2006) Biorecovered precious metals from industrial wastes: single step conversion of a mixed metal liquid wastes to a bioinorganic catalyst with environmental application. *Environmental Science and Technology* **40**, 1015-1021.

Essa A, Brown ML, **Macaskie LE** (2006) A new approach to the removal of heavy metals from liquid wastes via off gases produced by *Klebsiella pneumoniae*. *Biotechnology and Bioengineering* **95**, 574-583.

Creamer NJ, Baxter-Plant VS, Henderson J., Potter M., **Macaskie LE** (2006) Palladium and gold removal and recovery from precious metal solutions and electronic scrap leachates by *Desulfovibrio desulfuricans*. *Biotechnology Letters* **28**, 1475-1484.

Humphries AC, Nott KP, Hall LD, Macaskie LE (2005) Reduction of Cr(VI) by immobilized cells of *Desulfovibrio vulgaris* NCIMB 8303 and *Microbacterium* sp. NCIMB 13776 *Biotechnology & Bioengineering* **90**, 589-596.

Humphries AC, **Macaskie LE** (2005) Reduction of Cr(VI) by palladized biomass of *Desulfovibrio vulgaris* NCIMB 8303*Journal Chemical Technology and Biotechnology* **80**, 1378-1382.

Chassary P., Vincent, T., Sanchez Marcano J, **Macaskie LE**, Guibal E (2005) Palladium and platinum recovery from bi-component mixtures using chitosan derivatives. *Hydrometallurgy* **76**, 131-147.

Mikheenko IP, Mikheenko PM, Dementin S, Rousset M., **Macaskie LE** (2005) Nanoengineering of ferromagnetic palladium in hydrogenase negative mutants of *Desulfovibrio fructosovorans*. In *Proceedings, 16th International Biohydrometallurgy Symposium Cape Town South Africa* Eds. STL Harrison, DE Rawlings, J.Petersen. Published by 16th International Biohydrometallurgy Symposium, Cape Town ISBN 1-920051-17-1. pp 383-387.

Redwood M., Deplanche K., Yong P., Baxter-Plant VS, Macaskie LE (2005) Biomass-supported palladium catalysts on *Desulfovibrio* and *Rhodobacter*. In *Proceedings. Ibid*. pp 335-342.

Sanyahumbi D., de Vargas I., Climo M., Mabbett AN, Yong P, **Macaskie LE** (2005) Selective biosorption of palladium and platinum from, bi- and multimetallic solutions. *Ibid*. pp 571-579.

De Vargas I., Sanyahumbi D., Ashworth MA, Hardy CM, **Macaskie LE** (2005) Use of X-ray photelectron spectroscopy to elucidate the mechanism of palladium and platinum biosorption by *Desulfovibrio desulfuricans* biomass. *Ibid*. pp 605-616.

Essa AMM, **Macaskie LE**, Brown NL (2005) A new method for mercury removal *Biotechnology Letters* **27**, 1649-1655.

De Vargas I, **Macaskie LE**, Guibal E (2004) Biosorption of Pd and Pt by sulphate-reducing bacteria *J Chem Technol Biotechnol* **79**, 49-56.

Mikheenko IP, Baxter-Plant VS., Rousset M, Dementin S, Macaskie, LE (2004)Reduction of palladium (II) with *Desulfovibrio fructosovorans*, its [Fe]-only hydrogenase negative mutant and the activity of the obtained hybrid bioinorganic catalyst. In *Biohydrometallurgy: A Sustainable Technology in Evolution* Eds M. Tsezos, A. Hatzikioseyian, E. Remoundaki, National Technical University of Athens ISBN 960-88415-0-X pp 1147-1154.

Essa A, **Macaskie LE**, Brown NL (2004). Heavy metal precipitation by off-gases from culture of *Klebsiella pneumoniae* M426 *IIbid*. pp 1119-1126.

Chassary P, de Vargas Parody I, Ruiz M, **Macaskie LE**, Sastre A, Guibal E (2004) Platinum and palladium recovery from dilute acidic solutions using sulphate reducing bacteria and chitosan derivative materials. *Ibid*. pp 935-946.

Yong P, Rowson NA, Farr JPG, Harris IR, **Macaskie LE** (2003) A novel electrobiotechnology for the recovery of precious metals from spent automotive catalysts *Environ Technol* **24**, 289-297.

Yong P, Rowson NA, Farr JPG, Harris IR, **Macaskie LE** (2002) Bioreduction and biocrystallization of palladium by *Desulfovibrio desulfuricans* NCIMB 8307 *Biotechnol, Bioeng* **80**. 369-379.

Mabbett AN, **Macaskie LE** (2002) A new bioinorganic process for the remediation of Cr(VI) *J Chem Technol Biotechnol* **77**, 1169-1175

Yong P, **Macaskie LE** et al(2002) Bioaccumulation of palladium by *Desulfovibrio desulfuricans J Chem Technol Biotechnol* **77**, 593-601.

Yong P, Farr JPG, Harris IR, **Macaskie LE** (2002) Palladium recovery by immobilized cells of *Desulfovibrio desulfuricans* using hydrogen in a novel electrobioreactor *Biotechnol Letts* **24**, 205-212.

Yong P, Rowson, NA., Farr JPG, Harris IR, **Macaskie LE** (2003) A novel electrobiotechnology for the recovery of precious metals from spent automotive catalysts *Environmental Technology* **24**, 289-297.

Yong P, Rowson NA, Farr JPG, Harris IR, **Macaskie LE** (2002) Bioreduction and bio-crystallization of palladium by *Desulfovibrio desulfuricans* NCIMB 8307. *Biotechnology and Bioengineering* **80**, 369-379.

Yong P, **Macaskie LE** et al (2002) Bioaccumulation of palladium by *Desulfovibrio desulfuricans. J Chem Technol Biotechnol* **77**, 593-601.

Yong P, **Macaskie LE** et al (2001) Recovery of Pd & Pt from liquid waste & spent auto catalysts using *Desulfovibrio desulfuricans* in a flow-through electrobioreactor.In *Biohydrometallurgy: Fundamentals, Technology, Sustainable Development* Eds V.S.T. Ciminelli & O Garcia, Elsevier, pp 327-334.

Biohydrogen

Redwood MD, Paterson-Beedle M., **Macaskie LE** (2008) Integrating dark and light biohydrogen production strategies: towards the hydrogen economy *Rev Environ Sci Bio/Technol*, 8, 149-185.

Redwood MD, Mikheenko IP, Sargent F, **Macaskie LE** (2008) Dissecting the roles of *E coli* hydrogenases in biohydrogen production. *FEMS Microbiol Letters* **278**, 48-55

Macaskie LE, Redwood MD, Orozco R, Bridges N (2008) 'Bio' solutions to recover 'bio' energy from 'bio' wastes *J. Biotechnol* **S136**, S429.

Redwood MD, **Macaskie LE** (2006) A two-stage, two organism process for biohydrogen from glucose. *Int J Hydrogen Energy* **31**, 1514-1521.

Penfold DW, Sargent F, **Macaskie LE** (2006) Effect of knocking out the twin arginine transport (tat) system of *E. coli* strains MC4100 and HD701 on hydrogen production. *FEMS Microbiology Letters* **262**, 135-137.

Pedfold DW, **Macaskie LE** (2004) Production of H_2 from sucrose by *Escherichia coli strains* carrying the pUR plasmid which encodes invertase activity *Biotechnol Letts* **26**, 1879-1882

Penfold DW, Forster CF, Macaskie LE (2003) Increased hydrogen production by *Escherichia coli* strain HD701 in comparison with the wild-type parent strain MC4100 *Enz Microbial Technol* **33**, 185-189.

Humphries, A.C., Penfold, D.W., Forster, C.F. Macaskie, L.E. (2004).Chromate reduction by immobilized cells of *Desulfovibrio vulgaris* using biologically produced hydrogen. In *Biohydrometallurgy: A Sustainable Technology in Evolution* Eds M. Tsezos, A. Hatzikioseyian, E. Remoundaki, National Technical University of Athens ISBN 960-88415-0-X pp 525-532.

Nuclear wastes and uranium

Paterson-Beedle M, **Macaskie LE**, Readman JE, Hriljac JA (2009) Biorecovery of uranium from minewaters into pure mineral product at the expense of plant wastes *Adv Mats Res*, **71-73**, 621-624.

Macaskie LE, Mennan CM Paterson-Beedle M, Readman JE, Hriljac JA (2008) Removal of radionuclides into biogenic metal phosphate matrices: a novel remediation strategy *Geochim Cosmochim Acta* **72**, A580-A580

Paterson-Beedle M, **Macaskie LE**, Lee CH, Hriljac JA, Jee KY, Kim WH (2006) Utilisation of a hydrogen uranyl phosphate-based ion exchanger supported on biofilm for the removal of cobalt, strontium and caesium from aqueous solutions. *Hydrometalurgy I* **83**, 141-145.

Lloyd, J.R., Yong, P., **Macaskie, L.E**. (2000)Biological reduction and removal of Np(V) by two microorganisms. *Environmental Science and Technology* **34***,* 1297-1301.

Paterson-Beedle M, **Macaskie LE**, Lee H, Hriljac JA, Jee KY, Kim WH (2006) A novel hydrogen uranyl phosphate-based inorganic ion exchanger for the removal of ^{60}Co ^{85}Sr and ^{137}Cs from aqueous solutions *Recent Advances in Actinide* Paterson-Beedle, M., Macaskie, L.E. (2004)Removal of cobalt, strontium and caesium from aqueous solutions using native biofilm of *Serratia* sp. and biofilm pre-coated with hydrogen uranyl phosphate. In *Biohydrometallurgy: A Sustainable Technology in Evolution* Eds M. Tsezos, A. Hatzikioseyian, E. Remoundaki, National Technical University of Athens ISBN 960-88415-0-X . pp 1155-1162.

Paterson-Beedle M., **Macaskie LE**, Lee, CH, Hriljac, JA, Jee KY, Kim WH (2005). Utilisation of a hydrogen uranyl phosphate-based ion exchanger supported on a biofilm for the removal of cobalt, strontium and caesium from aqueous solutions. In *Proceedings, 16th International Biohydrometallurgy Symposium Cape Town South Africa* Eds. STL Harrison, DE Rawlings, J.Petersen. Published by 16th International Biohydrometallurgy Symposium, Cape Town ISBN 1-920051-17-1. pp 319-324.

Paterson-Beedle M, **Macaskie LE** (2004)Removal of cobalt, strontium and caesium from aqueous solutions using native biofilm of *Serratia* sp. and biofilm pre-coated with hydrogen uranyl phosphate. In *Biohydrometallurgy: A Sustainable Technology in Evolution* Eds M. Tsezos, A. Hatzikioseyian, E. Remoundaki, National Technical University of Athens ISBN 960-88415-0-X pp 1155-1162.

Paterson-Beedle M, Nott KP, **Macaskie LE**, Hall LD (2001) Three dimensional imaging of *Citrobacter* biofilm reactors used for a metal accumulation process. In *Biohydrometallurgy: Fundamentals, Technology and Sustainable Development* Eds V.S.T. Ciminelli & O Garcia, Elsevier, pp 599-604.

Yong P, **Macaskie LE** (1999) The role of sulfate as a competiitve inhibitor of enzymatically-mediated metal uptake by a *Citrobacter* sp.: implications in the bioremediation of acid mine drainage water using biogenic phosphate precipitant *J Chem Technol Blotechnol* **74**, 1149-1156.

Lloyd JR, Thomas GH, Finlay JA, **Macaskie LE** (1999) Microbial reduction of technetium by *Escherichia coii* and *Desulfovibrio desulfuricans*: enhancement va the use of high-activity strains and effect of process parameters *Biotechnol Bioeng* **66**, 122-130.

Bioremediation, microbiology and microbe-metal interactions

Mikheenko I,RoussetM, Dementin S, ***Macaskie LE*** *(2008) Bioaccumulation of palladium by* Desulfovibrio fructosovorans *and hydrogenase deficient strains.* Appl Environ Microbiol *19, 6144-6146*

Pumpel T, **Macaskie LE**, et al (2003) Ni removal from nickel plating waste water using a biologically active moving sand filter. *Biometals* **16**, 567-581.

Essa AMM, Macaskie LE, Brown NL (2002) Mechanisms of mercury bioremediation *Biochem Soc Trans* **24**, 1261-1267.

Humphries AC, **Macaskie LE** (2002) Reduction of Cr(VI) by *Desulfovibrio vulgaris* and *Microbacterium* sp. *Biotechnol Letts* **24**, 126101267.

Mabbett AN, Lloyd J, **Macaskie LE** (2002) Effect of complexing agents on reduction of Cr(VI) by *Desulfovibrio vulgaris. Biotech Bioeng* **79**, 389-397.

Pattanapipitpaisal P, Mabbett AN, Finlay JA, Essa AF, **Macaskie LE** (2002) Reduction of Cr(VI) and bioaccumulation of chromium by Gram positive and Gram negative bacteria not previously exposed to Cr-stress *Environ Technol* ***23***, 731-745.

Allan V, Macaskie LE et al (2002**)** Effect of nutrient limitation on biofilm formation & phosphatase activity of a *Citrobacter* sp. *Microbiol* **148**, 277-288.

Lloyd J, **Macaskie LE** et al (2001) Metal reduction by sulphate-reducing bacteria: physiological diversity, metal specificity. *Hydrometall* **59**, 327-337.

Pattanapipitpaisal P, Brown NL, **Macaskie LE** (2001) Chromate reduction and 16S rRNA identification of bacteria isolated from a Cr(VI) contaminated site. *Appl Microbiol Biotechnol* **57**, 257-261.

Boswell CD, Dick RE, Eccles H, **Macaskie LE** (2001) Phosphate uptake and release by *Acinetobacter johnsonii* in continuous culture and coupling to heavy metal accumulation *J Ind Microbiol* **26**, 333-340.

Mabbett AN, **Macaskie LE** (2001) A novel isolate of *Desulfovibrio* sp. with enhanced ability to reduce Cr(VI) *Biotechnol Letts* **23**, 683-687.

Pumpel T, Ebner C, Pernfuss B, Diels L, **Macaskie LE** (2001) Treatment of rinsing water from electroless nickel plating with a biologically active moving sand filter *Hydrometallurgy* **59**, 383-393.

Basnakova, G, Macaskie LE (2001) Microbially-enhanced chemisorption of Ni^{2+} ions into biologically-synthesied hydrogen uranyl phosphate (HUP) and selective recovery of concentrated Ni^{2+} using citrate or chloride ion *Biotechnol Letts* **23**, 67-70.

Pattanapipitpaisal P, Brown N, **Macaskie LE** (2001) Cr(VI) reduction by *Mic. liquefaciens* immobilised in polyvinyl alcohol *Biotechnol Letts* **23**, 61-65.

Mikheenko, I., Mikheenko, P., Darlington, C.N.W., Muirhead, C.M., **Macaskie, L.E**. (2001).Magnetic testing of Pd loaded bacteria. In *Biohydrometallurgy: Fundamentals, Technology and Sustainable Development* Eds V.S.T. Ciminelli & O Garcia, Elsevier, pp 525-532.

Pattanapipitpaisal, P., Hobman, J.H., Brown, N.L., Macaskie, L.E. (2001) Bioreduction of Cr(VI) by *Microbacterium liquefaciens* isolated from tannery waste and use of immobilised cells for continuous removal of Cr(VI) *Ibid.* pp 343-350.

Diels, L., **Macaskie LE** et al. (2001) Heavy metals removal by sand filters inoculated with metal sorbing and precipitating bacteria. *Ibid.* pp 317-326.

Macaskie LE et al (2000) Enzymically-mediated bioprecipitation of uranium by a *Citrobacter* sp: a concerted role for extracellular lipopolysaccharide and associated phosphatase in biomineral formation.*Microbiology* **146**, 1855-1867.

Badar U, Ahmed N, Beswick AJ, **Macaskie LE** (2000) Reduction of chromate by microorganisms isolated from metall contaminated sites of Karachi, Pakistan *Biotechnol Letts* **22**, 829-836.

Thomas RAP, Beswick AJ, Basnakova G, **Macaskie LE** (2000) Growth of naturally occurring microbial isolates in metal-citrate medium and bioremediation of metal citrate waste *J Chem Technol Biotechnol* **75**, 187-195.

Bonthrone KM, Quarmby J, Hewitt CJ, **Macaskie LE** (2000) The effect of the growth medium on the composition and metal binding behaviour of the extracellular polymeric matrix of a metal accumulating *Citrobacter* sp *Environ Technol* **21**, 123-134.

Thomas RAP, Beswick AJ, Basnakova G, Moller R., **Macaskie LE** (2000). Growth of naturally occcurring microbial isolates in metal-citrate medium and bioremediation of metal citrate wastes. *Journal of Chemical Technology and Biotechnology* 75, 187-195

Boswell CD, Dick RE, **Macaskie LE** (1999) The effect of heavy metals and other environmental conditions on the anaerobic phosphate metabolism of *Acinetobacter johnsonii Microbiology* 145, 1711-1720.

Pernfuss, B., Ebner, C., Pumpel, T., Diels, L., Macaskie, L.E., Tsezos, M., Keszthelyi, Z , Glombitza, F. (1999). The behaviour of five metal

biosorbing and bioprecipitating strains inoculated in a moving bed sandfilter. In *Biohydrometallurgy and the Enviroment Toward the Mining of the 21st Century*. Eds R. Amils, A. Ballester, Elsevier, pp. 373-382.

Pumpel, T., Ebner, C., Pernfuss, B., Schinner, F., Diels, L., Keszthelyi, Z, Macaskie, L.E., Tsezos, M, Wouters, H. (1999). Removal of nickel

from plating rinsing water with a moving bed sandfilter inoculated with metal sorbing and precipitating bacteria. *Ibid*. pp. 383-392.

Diels, L., Spaans, P.H, Van Roy S., Hooyberghs, L., Wouters, H., Walter, E., Winters, J., Macaskie, L.E., Finlay, J., Pernfuss, B., Pumpel, T (1999) Heavy metals removal by sand filters inoculated with metal sorbing and precipitating bacteria. *Ibid*. pp. 607-616.

Basnakova G, **Macaskie LE** (1999) Accumulation of zirconium and nickel by a *Citrobacter* sp *J Chem Technol Biotechnol* 74, 509-514.

Allan V, **Macaskie LE**, Callow M (1999) Development of a pH gradient in a biofilm is dependent upon the limiting nutrient *Biotech Letts* **21**, 407-413.

Finlay JA, Allan VJM, Conner A, **Macaskie LE** (1999) Phosphate release and heavy metal accumulation by biofilm-immobilized and chemically-coupled cells of a *Citrobacter* sp. pre-grown in continuous culture *Biotechnol Bioeng* **63**, 87-97.

Jeong B, **Macaskie LE** (1999) Production of 2 phosphatases by *Citrobacter* sp, grown in batch & continuous culture *Enz Microb Techn* **24**, 218-224

Non-invasive bioreactor imaging and modelling

Von der Schulenberg DAG, Holland DJ, Peterson-Beedle M, **Macaskie LE**, Johns ML (2008) Spatially resolved quantification of metal ion concentration in a biofilm-mediated ion exchanger *Biotechnol Bioeng* **99**, 821-829.

Graf von der Schulenberg DA, Paterson-Beedle M, **Macaskie LE**, Gladden LF, Johns ML (2008) Bioremediaiotn process optimization via magnetic resonance imaging *J. Biotechnol*. **136S**, S494-S495.

Von der Schulenberg DAG, Paterson-Beedle M, **Macaskie LE**, Gladden LF, Johns ML (2007) Flow through an evolving porous media-compressed foam *J Mats Sci* **42**, 6541-6548.

Nott KP **Macaskie LE** et al (2005) Measurement of flow field in biofilm reactors by 3-D magnetic resonance imaging *AIChemEng J* **51**, 3072-3079.

Nott KP, **Macaskie LE** et al (2005)Visualization of the function of a biofilm reactor by magnetic resonance imaging *Can J Chem Eng* **83**, 68-79.

Nott K, **Macaskie L** et al (2001) Visualisation of metal deposition in biofilm reactors by 3-D magnetic resonance imaging *Biotech Letts* **23**, 1749-1757.

Paterson-Beedle M, Nott KP, **Macaskie LE**. Hall LD (2001) Study of bioilm within a packed bed reactor by three-dimensional magnetic resonance imaging *Microbial Growth in Biofilms* Pt B **337**, 285-305.

Paterson-Beedle, M., Nott, K.P., Macaskie, L.E. Hall, L.D. (2001). Study of biofilm within a packed bed reactor by three dimensional magnetic resonance imaging. *Methods in Enzymology* **337**, 285-305.

Biomaterials

Yong P, Paterson-Beedel M. Liu W, Beuregard DA, Johns ML, **Macaskie LE** (2009) A study of biofilm and non line of sight bio-hydropxyapatite coatings using a *Serratia* sp. *Adv Mats Res* **71-73**, 741-744.

Ledo HM **Macaskie LE** et al (2008) Microstructure and composition of biologically synthesized hydroxyapatite J *Mats Sci Mats Med* **19**, 3419-3427

Lugg H **Macaskie LE** et al(2008) Polyhydroxybutrrate accumulation by a *Serratia* sp. *Biotechnol Letts* **30**, 481-491.

Yong P, Paterson-Beedle P, Lui W, Zhang Z, Graf von der Schulenberg DA, Johns ML, **Macaskie LE** (2008) A study of non line of sight biocoating by a *Serratia* biofilm *J. Biotechnol* **S136**, S428-S429.

Macaskie LE, Yong P, Paterson-Beedle M, Lugg H, Sammons RL, Marquis PM, Kashani M, Jenkins M, Stamboulis A (2008) Accumulation of polyhydrxybutyrate by a *Serratia* sp. *J. Biotechnol* **136S**, S406-S407.

Macaskie LE, Yong P, Paterson-Beedle M, Thackray AC, Marquis PM, Sammons RL, Nott KP, Hall LD (2005) Novel non line of-sight method for coating hydroxyapatite onto surfaces of support materials by biomineralization. *Journal Biotechnology* **118**, 187-200.

Yong P, **Macaskie LE,** Sammons RL, Marquis PM (2004) Synthesis of nanophase hydroxypatite by a *Serratia* sp. from wastewater containing inorganic phosphate *Biotechnol Letts* **26**, 1723-1730.

Thackray AC, **Macaskie LE** et al (2004) Bacterial biosynthesis of calcium bone-substitute material. *J Mats Sci Mats Med* **15**, 403-406.

Thackray, A., Yong, P. Sammons, R.L., Lugg, H. Macaskie, L.E,. Marquis. P.M.(2004) Bacterial delivery of nanophase hydroxyapatite and tricalcium phosphate as a novel coating method for complex architectures. *European Cells and Materials* **7**, 89.

Yong, P., Sammons, R.L., Marquis , P.M., Lugg, H., Macaskie, L.E. (2004**) Synthesis of nanophase hydroxyapatite by *Serratia* sp. N14. pp 1205-1214.**Synthesis of nanophase hydroxyapatite by sp. N14. pp 1205-1214.

General, cross-cutting and reviews

Macaskie LE et al (2009) Today's wastes, tomorrows's materials for environmental protection *Adv Mats Res* **71-73**, 541-548.

Lloyd JR, Pearce CI, Coker VS, Pattrick RAD, Vaughan D, Paterson-Beedle M, Mikheenko IP, Yong P, **Macaskie LE** (2008) Biomineralization: linking the fossil record to the production of high value functional materials *Geobiology* **6**, 285-297.

Macaskie LE (2007) Harnessing biomineralization: from cell factories to functional bionanomaterials *Geochim Cosmo Acta* **71**, A608-A608.

Macaskie LE, Baxter-Plant VS, Creamer NJ, Humphries AC, Mikheenko IP, Penfold DW, Yong P (2005) Applications of bacterial hydrogenases in waste decontamination, manufacture of novel bionanocatalysts and in sustainable energy. *Biochemical Society Transactions* **33**, 76-79.

Glendinning K, Macaskie LE, Brown NL (2005) Mercury tolerance of thermophilic *Bacillus* sp. & *Ureibacillus* sp. *Biotechnology Letts* **27**, 1657-1662.

Lloyd JR., Anderson RT, **Macaskie LE** (2005) Bioremediation of Metals and Radionuclides In 'Bioremediation: Applied Microbial Solutions to Real-World Environmental Cleanup' Eds R. Atlas and J. Philp AMS Press (Washington) pp 293-317.

Paterson-Beedle M, **Macaskie LE** (2005) Use of PhoN phosphatase to remediate heavy metals. *Methods Biotechnology* 18, 413-436.

Macaskie, L.E., Yong, P., Paterson-Beedle, M. (2004).Bacterial precipitation of metal phosphates. In *Phosphorus in Environmental Technologies.* Ed E. Valsami-Jones IWA Publishing, pp. 549-581

Sammons, R.L, Marquis, P.M., Macaskie, L.E., Yong, P., Basner, C (2004). Developments in the use of calcium phosphates as biomaterials. In *Phosphorus in Environmental Technologies.* Ed E. Valsami-Jones IWA Publishing, pp. 582-609.

Lloyd JR, Lovley DR, **Macaskie LE** (2003) Biotechnological applications of metal reducing microorganisms. *Adv Applied Microbiology* 53, 85-119.

Lloyd, J.R., Macaskie, L.E. (2002). Basis of microbe-radionuclide interactions In *Interactions of Microorganisms with Radionuclides* Eds M.J. Keith-Roach and F.J. Livens Elsevier pp. 313-342.

Macaskie, L.E., Lloyd, J.R. (2002) Microbial interactions with radioactive wastes and potential applications. In *Interactions of Microorganisms with Radionuclides* Eds M.J. Keith-Roach and F.J. Livens Elsevier pp. 343-382.

Lloyd, J.R., Macaskie, L.E. (2000) Bioremediation of radionuclide-contaminated wastewaters. In *Environmental Microbe-Metal Interactions*. Ed D.R. Lovley ASM publications pp. 277-328.

Macaskie, L.E., Yong, P., Mikheenko, I.P. (2001) Microbial recovery of platinum group metals. In *Hydrogen as a Fuel* Eds R. Cammack, M. Frey, R. Robson, Taylor & Francis pp 197-198.

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