

Name: MARIO SANCHEZ MEDINA (mario.sanchez@unab.cl)

Private e-mail: mario@sanchez-m.com

Today: Head of Metallurgical Dept, Universidad Andres Bello, Santiago

Nationality: Chilean (November 11th, 1946)

Work Address Universidad Andres Bello / Sazié 2315, Piso 1, Santiago, Chile / Tel 56-2-2661 8300

Home Address Santo Domingo 462, Depto 1003, Santiago, Chile. Tel (Mobile) +56 9 98888165

Field of Work: Extractive Metallurgy, Thermodynamics, High Temperature Processes, Environment in Mining and Metallurgy, Economics applied to Mining and Metallurgy.

Languages: Spanish (mother tongue), English (fluent), French (fluent)

Academic Qualifications:

Metallurgical Engineer (*June 13th, 1973*), *University of Concepción, Chile*.
D.E.A. Metallurgy, (*September 25th, 1978*), *I.N.P.G., Grenoble, France*. Doctor of Engineering, (*December 3th, 1980*), *Institut National Polytechnique, Grenoble, Francia*.

Academic Visitor:

National University of Medellín, Colombia (Aug-Sept., 1988). Imperial College. London, UK. (*Post Doctorate stay*) (Nov 89 – Nov 90). Technical University of Kosice, Slovakia (Oct-Dec, 1996). Laval University, Quebec, Canada (Jan-Feb, 2000). San Agustín University, Arequipa, Perú (2000 and 2003).

Industrial and Consulting Experience:

Potrerrillos (Salvador) Smelter Plant – Codelco Chile (1969). Chuquicamata Smelter Plant, Codelco Chile (1972-1973). Hatch Eng. & Consulting, Santiago, Chile (2008-2009).

Administration Duties at the University of Concepcion:

Head of Chemical Metallurgy Section, Department of Metallurgical Engineering (1985-1986). Head of Technological Research Institute (IIT), Engineering Faculty (1991-1995). Head of Metallurgical Department, Engineering Faculty (1998-2000).

MAIN RESEARCH

1.- With the support of the University of Concepcion

- >Harmful impurities to the mechanical and electrical properties of Copper. Minimisation of their effects by improvements of refining conditions, Internal Research Project No. 20.95.04, University of Concepción, 1982.
- >Thermodynamic of Cu-Fe-O System. Phase presents at temperatures of

interest in pyrometallurgy, Internal Research Project No. 20.95.17, University of Concepción, 1985.

>Thermodynamic Stability of Cu-Fe-S-O system during solid gas reactions, Internal Research Project No. 20.95.09, University of Concepción, 1986.

>Hydrometallurgical Extraction of copper from sulphide minerals, using sulphuric gas as agent to produce sulphate compounds, Internal Research Project No. 20.95.24, University of Concepción, 1986.

>Characterisation of commercial coppers and effect of impurities, Internal Research Project No. 20.95.39, University of Concepción, 1989.

>Neutralisation of Arsenic and Sulphur by Roasting sulphide concentrates of Copper, Internal Research Project No.91.95.42-1, University of Concepción, 1991.

>The use of *glacilera chilensis* bio mass for decontamination of liquid mining effluents, Internal research supported by the Clean Technology Group, Department of Metallurgy, University of Concepción, 1999.

2.- With the support of CODELCO and the University of Chile

>Behaviour of the Teniente Converter Slags, Department of Mines, University of Chile, Santiago, Chile, 1997-1998.

3.- With the support of the French Government

>Influence of alloy elements on interfacial parameters of Cu-Pb system, Ecole National Supérieure d'Electrometallurgie et Electrochimie, INPG, Grenoble, France, 1977-1978 (*One year D.E.A. Stay Rapport*)

>Effect of impurities on mechanical behaviour of commercial copper and microstructure of equilibrium in the existing phases, Ecole National Supérieure d'Electrometallurgie et Electrochimie, INPG, Grenoble, France, 1977-1980 (*Four year Dr. Eng. Thesis*).

>Development of New metallurgical production processes, Project ECOS French Government, Department of Metallurgical Eng., University of Concepcion, 1994-1996.

4.- With the support of the British Council

>Stability of copper ferrites during roasting/ Oxidation of enargite using calcium oxide", Department of Materials, Imperial College of Science, Technology and Medicine, London, UK, 1990 (*One year Post Dr. Eng. Stay*).

>Development of novel routes for roasting copper-bearing concentrates without the emission of sulphur and arsenic bearing gases", Link SAN 984-49, Imperial College-University of Concepcion, 1993-1996.

5.- With the support of Swedish Agencies

>Development of an arsenic sensor in a gas-phase", Link between Royal Institute of Technology, Stockholm, Sweden and the University of Concepción, 1997.

6.- With support of Chilean Agencies (CONICYT, Mining Ministry, Others)

>Application of the system Cu-Fe-S-O-SiO₂ Thermodynamic data to copper smelters, FONDECYT Project No. 0466, CIMM and Department of Metallurgical Eng., University of Concepción, 1987.

- >Characterisation of commercial copper and effect of impurities, FONDECYT Project No. 91-0401, Department of Metallurgical Eng., University of Concepcion, 1991
- >Development of an integrated and not contaminated process for copper concentrates treatment, FONDEF Project No. 2-71, Department of Metallurgical Eng., University of Concepcion, 1994.
- >Research on stability of the system As-S-O-Iron Oxides, as an alternative method to neutralise Arsenic from smelter gases, FONDECYT Project No. 1000474, Department of Metallurgical Eng., University of Concepcion, 2000-2002.
- >Research on How to obtain commercial products from Chilean copper smelter slags, FONDEF Project No. DO211159, Department of Metallurgy, University of Concepción, 2003-2004-2005.-
- >Characterisation and Evaluation of Technologies for treating Liquid Effluents and Sludge produced during mining activity in Chile, Mining Ministry-University of Concepcion Project, OT No. 96-327-1, 1997-1998
- >Development of control systems in copper concentrate smelters, Project supported by SONDA and the University of Concepcion, OT No. 87-045-1, 1987-1988
- >Analysis of Consumption Factors in Huachipato Steel Plant, Project supported by Huachipato Steel Plant Co., OT No. 93-347-1, University of Concepcion, 1993.
- >Behaviour of Copper concentrates and reactions during stocking in piles, Project supported by Escondida Mining Co., OT No. 97-89-1, University of Concepcion, 1997.
- >Data analysis to establish control strategies for air blowing during copper conversion, Project supported by Disputada las Condes Mining Co., OT No. 97-226-1, University of Concepción, 1997.
- >Control of Copper Pyrometallurgical Processes, Project supported by CORFO, SONDA and the University of Concepción, 1988-1990.

7.- With the support of European Community

- >ALPHA TEC LIMIN Project, 2004 to 2007, on Clean Technologies for the mining and metallurgical industries, with the participation of Cuba, Equator, Peru, Brazil, Bolivia, Chile, Sweden, Spain, Austria and Italy (www.udec.cl/alfat/).
- >RED MASyS Project, 2010-2013, IBERO-AMERICAN PROGRAMME FOR SCIENCE, TECHNOLOGY AND DEVELOPMENT, on Underground Mining sustainability, with the participation of Argentina, Bolivia, Brazil, Chile, Cuba, Equator, Spain, Mexico, Peru, Portugal and Venezuela (www.cerena.ist.utl.pt/masysnet/)

PUBLICATIONS

1.- Books and Proceedings (in English or Spanish)

- Clean Technologies for the Copper industry, Vol I, (M. Sánchez, Editor University of Concepcion, Department of Metallurgical Eng., 12 papers, 152 pages, 1993 (English+Spanish)

- Chemical Metallurgy (Proceeding of the IV Meeting of the Southern Hemisphere on Mineral Technology (I. Wilkomirsky, M. Sánchez, Ch. Hecker, Editors) University of Concepción, Department Metallurgical Eng., 33 papers, 409 pages, 1994 (English, ISBN 956-227-104-8)

- Clean Technologies for the Copper industry, Vol II (M. Sánchez, Editor) University of Concepción, Department of Metallurgical Eng., 21papers, 266 pages, 1995 (English+Spanish, ISBN 956-227-110-2)

- Clean Technology for the Mining Industry, Proceedings of the III International Conference on Clean Technologies for the Mining Industry, Santiago, Chile 15-17 May, 1996 (M. Sánchez, F. Vergara, S. Castro, Eds.) University of Concepción, Department of Metallurgical Eng., 47papers, 550 pages, 1996 (English, ISBN 956-227-127-7)

- Effluent treatment in the Mining Industry (S. Castro, F. Vergara, M. Sánchez, Eds.) University of Concepcion, Department of Metallurgical Eng., 389 pages, 1998 (English, ISBN 956-227-156-0).

- Environment & Innovation in Mining and Mineral Technology, Vol. I, Proceedings of the IV International Conference on Clean Technologies for the Mining Industry, Santiago, Chile 13-15 May, 1998, (M. Sánchez, F. Vergara, S. Castro, Eds.) University of Concepción, Department of Metallurgical Eng., 39 papers, 487 pages, 1998 (English, ISBN 956-227 158-7).

- Environment & Innovation in Mining and Mineral Technology, Vol. II. Proceedings of the IV International Conference on Clean Technologies for the Mining Industry, Santiago, Chile 13-15 May, 1998, (M. Sánchez, F. Vergara, S. Castro, Eds.) University of Concepcion, Department of Metallurgical Eng., 45 papers, 529 pages, 1998 (English, ISBN 956-227 159-5).

- Waste treatment and environmental impact in the mining industry. Proceedings of the V International Conference on Clean Technologies for the Mining Industry, Santiago, Chile 9-13 May, 2000 (M. Sánchez, F. Vergara, S. Castro,Eds) University of Concepcion, Department of Metallurgical Eng., 47papers, 472 pages, 2000 (ISBN 956-227-2303).

- Environmental improvements in mineral processing and Extractive Metallurgy. Proceedings of the V International Conference on Clean Technologies for the Mining Industry, Santiago, Chile 9-13 May, 2000 (M. Sánchez, F. Vergara, S. Castro, Eds) University of Concepcion, Department of Metallurgical Eng., 46 papers, 488 pages, 2000 (English, ISBN 956-227-231-1).

- Mining and Metallurgy Dictionary (English-spanish/Spanish-english), Authors: Miguel Alarcón, Mario Sánchez, Universidad de Concepción, Dirección de Docencia, Proyecto Docencia 99-078, 2001, 284 páginas (Spanish, ISBN956-8029-25-7).

- Copper pyrometallurgy and behaviour of melt systems. (Authors: Mario Sánchez-University of Concepción, Chile & Ivan Imris-University of Kosice,

Slovakia), University of Concepción, Dirección de Docencia, Proyecto Docencia 97-054, 144 pages (Spanish, ISBN 956-8029-38-9/1st Edition 2002, -69-9/2nd Edition 2006).

-Health, Environment and Sustainable Development, Vol II of Copper Conference Proceedings (G. Lagos, A.E.M. Warner, M. Sanchez, Eds.), Chilean Mining Eng. Institute, 2003, 601 pages (English, ISBN 1-894475-35-6).

- Environmental Issues in the Mining and Metallurgical Industry, Authors: A. Valenzuela, M. Sanchez, E. Vircikova), University of Concepción, Dirección de Docencia, Proyecto Docencia 97-054, 2004, 166 pages (English, ISBN 956-8029-58-3).

- Tecnologías Limpias en la Industrias Extractivas Minero-Metalúrgica y Petrolera, Proceedings of the Jornadas Iberoamericanas, Santa Cruz, Bolivia, 12-16 Junio, 2006 (R. Villas Boas, M. Sanchez, Eds.) Red Alfa-Cyted, 22 papers, 344 pages (ISBN 85-7227-236-4).

- Minor Element Contaminants in Copper Metallurgy, Proceeding of the First Meeting held in Concepción, Chile, October 25-26, 2007 (J. Alvarez, R. Padilla, R. Parra, M. Sánchez, F. Vergara; Eds.), 18 papers, 200 pages (English, ISBN 978-956-227-315-2).

- Advances in Cleaner Technologies for the Mining and metallurgical Industry, Proceedings of the VIII International Conference on Clean Technologies for the Mining Industries, Santiago, Chile, April 13-16, 2008 (M. Sánchez, A. Valenzuela, E. Chaparro, A. Reghezza, J. Alvarez; Eds.), 32 papers, 387 pages (English, ISBN 978-956-227-319-0).

- Molten 2009, Proceedings of the VIII International Conference on Molten Slags, Fluxes and Salts, Santiago, Chile, January 18-21, 2009 (M. Sanchez, R. Parra, G. Riveros, C. Diaz, Eds.), 139 papers, 1433 pages (English, ISBN 978-956-8504-20-5).

- Cleanmining2011, Proceedings of the IX International Conference on Clean Technologies for the Mining Industry, Santiago, Chile, April 10-12, 2011 (M. Sanchez, Ed.), 48 papers, 119 pages (abstracts)+CD(papers) (English, ISBN 978-956-8504-43-4).

- Enviromine2011, Proceedings of the II International Seminar on Environmental Issues in the Mining Industry, Santiago, Chile, November 23-25, 2011 (M. Sanchez, D. Mulligan, J. Wiertz, Eds.), 45 papers, 113 pages (abstracts)+CD(papers) (English, ISBN 978-956-8504-61-8).

- Downstream fabrication and applications / Recycling and waste management, Proceedings of Copper2013 conference, Vol VI, Santiago, Chile, December 1-4, 2013 (J. Leibbrandt, M. Ignat, M. Sánchez, Eds), A Publication of The Chilean Institute of Mining Engineers, (IIMCH), 2013.

2.- Journals

-M. Sánchez, R. Sangiorgi, L. Coudurier, N. Eustathopoulos. Influence des additions de Pb et de Sn sur la ductilité du cuivre OFHC entre la température ambiante et 1000°C. Mem. et Et. Sci. Rev. Metallurgie, Février 1981, 101-109. (French)

-M. Sánchez, R. Sangiorgi, N. Eustathopoulos. On the embrittlement of copper by liquid lead inclusions. Scripta Metallurgia Vol. 15, 1981, 737-738. (English)

-M. Sánchez, L. Coudurier, N. Eustathopoulos. Microstructure d'équilibre et tensions interfaciales dans les systèmes biphasés solide-liquide Cu-Pb-M (M:Ag, Ni, Sn, Sb). Mem. et Et. Sci. Rev. Metallurgie, November 1981, 607-617. (French)

-M.A. Sánchez, B.S. Terry. An Alternative Process to Resolve Pollution by Sulphur and Arsenic in Copper Industry. Eng. Faculty, Journal, University of Concepción, 1 May, 1991, 33-36 (Spanish).

-B.S. Terry, G. Riveros, M. Sánchez, J.H.E. Jeffes "Lime-concentrate process for roasting of copper-bearing sulphides - part. 1: Analysis of optimum roasting conditions" Tras. IMM, Section C, Vol. 103, Sept.-Dec, 1994, C 193-C200 (English).

-C. Camurri, M. Sánchez "Rolling of Fire Refined Copper" Revista Latinoamericana de Transferencia Tecnológica (ISSN: 0716-8756) Vol. 6, N° 6, Nov. - Dic 1995 (Spanish)

-I. Imris, S. Rebolledo, M. Sánchez, S. Castro, G. Achurra, F. Hernández "The copper losses in the slags from El Teniente Process". Acta Metallurgica Slovaca, 4, 3/1998, 69-78 (English)

-M. Sánchez, S.H. Castro, F. Vergara "Environmental analysis of the Copper Chilean Industry". Rev. Minería Chilena, N° 219, Dec, 1998, pp. 65-66 (Spanish)

-P. Baláz, M. Achimovitová, M. Sánchez, R. Kammel "Attrition Grinding and Leaching of Enargite Concentrate". Metall, 53, Jahrgang, N° 1-2/1999, pp.53-56 (English)

-M. Achimovitová, P. Baláz, Z. Bastl, M. Sánchez "Characterization of the solid residue of enargite Cu_3AsS_4 after alkaline leaching". Physicochemical Problems of Mineral Processing, 33 (1999), 7-14. (English)

-I. Imris, S. Rebolledo, M. Sánchez, S. Castro, G. Achurra, F. Hernandez "The copper losses in the slags from the El Teniente process", Canadian Metallurgical Quarterly, Vol 39, Number 3, July 2000, pp 281-289 (English).

-P. Baláz, M. Achimovitová, Z. Bastl, T. Ohtani, M. Sánchez "Influence of mechanical activation on the alkaline leaching of enargite concentrate", Hydrometallurgy 54 (2000) 205-216 (English)

- M. Sanchez, R. Jara "Clean Production in Large Copper mining", Ecoamerica No. 16, Abril 2002, 7-9 (Spanish)
- S. Castro, M. Sánchez, M., "Environmental viewpoint on Small-scale Copper, Gold and Silver Mining in Chile", Journal of Cleaner Production 11 (2003) 207-213 (English)
- E. Balladares, A. Gonzalez, R. Parra, M. Sánchez "Fijación de arsénico en fase gas con hematita sólida", Rev. Metalurgia Madrid 40 (2004) 384-388 (Spanish)
- C. Gonzalez, R. Parra, A. Klenovcanova, I. Imris, M. Sanchez "Reduction of Chilean copper slags: a case of waste management project", Scandinavian Journal of Metallurgy, 2005; 35: 1-7(English)
- I. Imris, M. Sanchez, G. Achurra "Copper losses to slags obtained from the El Teniente process", Trans. Inst. of Mining and Metallurgy C, September 2005, Vol 114, C135-C140 (English)
- F. Parada, M. Sanchez, A. Ulloa, J. C. Carrasco, J. Palacios, A. Reghezza "Recovery of molybdenum from roasted copper slags", Trans. Inst. Of Mining and Metallurgy C, 2010 VOL 119 NO 3, C171-C174 (English)
- M. Devia, M. Sanchez "Comparative analysis of slag systems Cu-Fe-O-SiO₂ and Cu-Fe-O-CaO between 1100 and 1300 °C", Trans. Inst. Of Mining and Metallurgy C, 2011 VOL 120 NO 3, C177-C190 (English)
- J. Palacios, M. Sanchez "Wastes as resources: update on recovery of valuable metals from copper slags", Trans. Inst. Of Mining and Metallurgy C, 2011 VOL 120 NO 4, C218-C223 (English)
- E. Balladares, R. Parra, M. Sánchez, "Kinetic aspects on ferric arsenate formation in a fix bed gas-solid reaction system", published in www.dyna.medellin.unal.edu.co/, 2014 (Spanish)

3.- Conferences and Meetings

- R. Sangiorgi, M. Sánchez, N. Eustathopoulos. Influenza delle inclusioni liquide d'piombo e piombo stagno nella duttilità a caldo del Rame. Gionate Genovesi di Metalurgia. III Convegno Sullo Stato Metallico. Genova (ITALIA) 19-21, May 1979, 42-44. (Italian)
- R. Sangiorgi, M. Sánchez, N. Eustathopoulos. Fragilizzazioni del Rame da Piombo Liquide. IX Convegno Nazionale dell'Associazione Italiana per l'analisi delle sollecitazioni. Trieste, (ITALIA) 23-26 Sept. 1981., 25-32. (Italian)
- R. Sangiorgi, L. Coudurier, M. Sánchez, N. Eustathopoulos. Mechanical Properties of Copper and Pb-Sn Alloys at High Temperatures. II Congreso Nacional de Metalurgia, Concepción (CHILE), 5-9 October, 1981, 551-564 (Spanish).

- L. Coudurier, N. Eustathopoulos, M. Sánchez. Relative values of interfacial and intergranular tensions after the morphology of inclusions in the biphasic system Cu-Pb-Metal of addition. Jornadas de Metalurgia, Córdoba (ARGENTINA) April 1982, 385-408 (Spanish).
- M. Sánchez, F. Vergara. Impurities presents in copper: Their effects and control during electrorefining. III Meeting Mines Eng. Copiapó (CHILE), October 1982, 235-250 (Spanish).
- M. Sánchez, J.C. Leseigneur. Stability of copper and iron compounds in roasting. A graphic approach with a minicomputer. II Meeting Mines Eng. Copiapó (CHILE), October 1982, 258-272 (Spanish).
- M. Sánchez, J.C. Leseigneur, Characterization of concentrate roasting through stability diagrams. Three Dimensional Construction of the Cu-Fe-S-O System. I Meeting of the Southern Hemisphere of Mineral Tech., Rio de Janeiro (BRASIL), December 1982, 836-847 (Spanish).
- M. Sánchez. Liquid Metal Corrosión, VI Latinamerican Meeting of Electrochemistry and Corrosion, Oaxtepec (MEXICO) 15-20 May 1983, 301-302. (Spanish)
- R. Sangiorgi, M. Sánchez, P. Cañete. Deformation of Copper and Copper Alloys in 27-1000°C Temperature range. III National Meeting of Metallurgy. Santiago (CHILE) 24-28 October 1983. A468-A473. (Spanish).
- G. Ahlborn, M. Sánchez, A. Luraschi. Stability Diagram for the System Cu-Mo-S-O. III National Meeting of Metallurgy, Santiago (CHILE), 24-28 October, 1983, B177-B185. (Spanish).
- M. Sánchez, J. Acuña, A. Luraschi. Experimental Study of Slag Metal Equilibrium in the System Cu-Fe-O. 1984. Extractive and Process Metallurgy Meeting and Second International Symposium on Metallurgical Slags and Fluxes. Nevada (USA), 11-14 November 1984, 757-775. (English)
- J. Acuña, M. Sánchez, A. Luraschi. Metal-Slag and Slag Gas Equilibria in the Cu-Fe-O System. Interamerican Workshop on Alloy Theory and Phase Equilibria. Buenos Aires, (ARGENTINA), 12-15 August 1985, 91-95. (English)
- J. Espinel, M. Sánchez, A. Luraschi. The prediction of copper and iron activities in copper pyrorefining slags. II Meeting of the Southern Hemisphere on Mineral Technology, Rio de Janeiro, (BRASIL), 25-29 May 1987, 635-650. (English)
- M. López, M. Sánchez, P. Cañete, F. Grossman Deformation behaviour of copper and copper-lead alloys in the 300-1273 K Temperature Range. IX Interamerican Conference on Materials Technology Santiago (CHILE), 5-9 October 1987, 265-268 (Spanish).

- M. Bustos, M. Sánchez. The Modelling of Pyrometallurgical Process by a Thermodynamical Approach. International Conference Copper '87. Viña del Mar (CHILE), 30 Nov - 3 Dec. 1987. 473-487. (English)
- L. Retamal, H. Méndez, M. Sánchez. Applied Automation to Smelting and Converting Processes of Copper Concentrates. III Latin-American Meeting of Automation. VIII Congress Chilean Association Automatic Control, Viña del Mar (CHILE), November 1988, 140-144. (Spanish)
- M. López, M. Sánchez, M. Valenzuela, F. Grossman. Deformation and Fracture of Electro refined Copper. I Meeting ALAMET, Rio de Janeiro, (BRASIL), 27 Nov-02 December 1988, 1155-1161 (Spanish).
- López, M. Sánchez, V. San Martín, M. Valenzuela. Copper Embrittlement by Sb and O at High Temperatures. X Interamerican Conference on Materials Technology, San Antonio (USA), April, 1989, (Spanish).
- M. López, M. Sánchez. Effect of Antimony on Mechanical Properties of Copper During Metal Forming. First French-Chilean Symposium in Chemistry, Santiago (Chile) 27 August - 01 September, 1989. 475-479 (Spanish).
- L. Retamal, G. Larenas, M. Sánchez. Automation of Copper Concentrates Smelters. 6th IFAC Symposium in Mining, Mineral and Metal Processing. Buenos Aires (Argentina), 4-8 September 1989, 473-477. (English)
- M. Cerna, M. Sánchez, A. Luraschi. Thermodynamic Modelling of Copper Smelting Systems Using a Personal Computer. Third Bienal Conference and Computer Software for Chemical and Extractive Metallurgy Calculations. Rolla (U:S:A:) 4-8 June 1989. (English)
- M. Sánchez, B. Terry. Stability of Cupric Ferrite at Temperatures concerned to Copper Pyrometallurgy. I Congress IBEROMET, VI National Meeting Metallurgy, Santiago (CHILE), 11-18 November 1990. 93-101 (Spanish).
- M.A. Sánchez, B.S. Terry. Thermodynamical and Experimental Antecedents to Neutralise Arsenic in Copper Smelter Plants. 42nd Meeting, IIM, Chile, Concepción, Oct. 1991. (Spanish)
- M. López, M. Sánchez "Evaluation of harmful impurities in Electro refined copper". Proceedings of the meeting about different Research held on Economical Geology in Chile, 26-27 Mayo 1991, University of Concepción, Chile, p. 75. (Spanish)
- L. Retamal, M. Sánchez "Estimating of smelting furnace temperature using the concentrate and slag compositions" CONAMET VII, Oct. 20-23, 1992. Concepción, Chile. (Spanish)
- M. López, M. Sánchez, R. Morales, F. Grossmann. The Antimony Effect in Maps of Deformation Mechanisms for Copper. (Presented at Argentinian Metallurgical Meeting, "SAM 92", Rosario, Argentina, May 1992) (Spanish)

- M.A. Sánchez, "Arsenic and sulphur neutralization in copper Concentrates". I Meeting on Clean Technologies for the Copper Industry, Concepción, Chile, March, 1992. p. 63-72. (Spanish)
- M. López, M. Sánchez, C. Camurri, and F. Grossman. "Impurities such as Selenium, Antimony and Iron in commercial Coppers and their undesirable effects in Mechanical application". First International Conference on Processing Materials for Properties. T.M.S. Hawaii, Honolulu, Nov. 1993. (English)
- B.S. Terry, M.A. Sánchez, A.G. Ulloa "Calcium oxide as a reagent for the capture of arsenic emissions during the roasting of enargite (Cu_3AsS_4)" TMS-International Symposium on Extraction and Processing for the treatment and Minimisation of Wastes, San Francisco, USA, Feb 27 - March 3, 1994. (English)
- C. Camurri, M. López, M. Sánchez, J. Soto "Fire refined copper. Effect of oxygen on the Ductility" EPD Congress Annual Meeting TMS, San Francisco, USA, March 1994. pp. 601-613 (English)
- A. Ulloa, M. Sánchez, B.S. Terry "Use of CaO for preventing emissions of Arsenic in copper industry" II Meeting on Clean Technologies for the copper industry, EXPOMIN '94, Santiago, Chile, May 11-13, 1994 pp. 125-134. (Spanish)
- C. Camurri, M. Sánchez, "Forming of copper fire refined. Effect of oxygen content" en CONAMET VIII - ALAMET III; August 9-12, 1994. Antofagasta, Chile. (Spanish).
- A. Ulloa, M. Sánchez, B. S. Terry "Lime roasting of enargite" The IMM Pyrometallurgy'95, Cambridge, UK, July 1995, pp. 275 - 283. (English).
- B.S. Terry, M. Sánchez "Environmentally friendly processing of copper minerals bearing arsenic and/or sulphur by pyrometallurgical routes" in Copper'95, Nov. 1995, pp. 337-345. Santiago, Chile (English)
- Y. Fan, R. Padilla, M.Sánchez, I. Wilkomirsky "Arsenic removal from copper concentrate by neutral and oxidising roasting" in Clean Technologies for the Mining Industry, May 1996, Santiago, Chile, pp.299-311 (English)
- R. Padilla, Y. Fan, M.Sánchez, I. Wilkomirsky "Arsenic Volatilisation from enargite concentrate" in 1997 EPD Congress, February, 1997, pp 73-83, Orlando, Florida (USA) (English)
- Y. Fan, R. Padilla, M.Sánchez, I. Wilkomirsky, "Arsenic abatement in copper extraction (Part I. Thermodynamic stability of arsenic compounds during roasting", in V Southern Hemisphere Meeting on Mineral Technology, May 1997, pp 225-228, B. Aires (Argentina) (English)
- S. Castro, F. Vergara, M. Sánchez "Clean Technology for the Mining & Metallurgical Industry" First National Meeting on Environment and Mining Safety, Lima. Perú, June 1997, pp. 59-71 (Spanish)

- R. Padilla, Y. Fan, M. Sánchez, I. Wilkomirsky “Processing High Arsenic Copper Concentrates” In Environment & Innovation in the Mining and Mineral Technology (Proceedings of the IV Conference on Clean Technologies for the Mining Industry) May 1998, Santiago, Chile) pp 603-612 (English)
- S.H. Castro, M. Sánchez, F. Vergara, E. Oyaneder “Water and Slurry wastes assessment in the Chilean copper industry” in Environment & Innovation in the Mining and Mineral Technology (Proceedings of the IV Conference on Clean Technologies for the Mining Industry) May 1998, Santiago, Chile) pp 1005-1016 (English)
- P. Baláz, M. Achimovitová, M. Sánchez “Selective Leaching of Arsenic from Mechanically Activated Enargite” in Environment & Innovation in the Mining and Mineral Technology (Proceedings of the IV Conference on Clean Technologies for the Mining Industry) May 1998, Santiago, Chile, pp 297-303 (English)
- M. Sánchez “Main environmental problems in mining and some technological solutions” in X CONAMET (Invited Plenary Conference), Oct. 1998, Copiapó, Chile, (Spanish)
- M. Sánchez “An strategic point of view for further relationship with the mining industry in Chile”, 49 IIMCh Convention, Oct. 1998, Marbella, Chile, pp 391-399 (Spanish)
- S. Castro, M. Sánchez, F. Vergara “An environmental & Technical point of view for the Mining Industry in Chile”, XXIV Peruvian Mining Eng. Convention, September 1999, Arequipa, Perú., CD Edition, (Spanish)
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Others:

- **Lectures and courses addressed to the Mining and Metallurgical industries:** Chuquicamata Smelter Plant, Codelco Chile (1986, 1988, 1991, 1992). Chuquicamata Refinery, Codelco Chile (1988). ENAMI, Copiapó, Chile (1988). Pacifico Mining Co., Huasco, Chile (1989). Chagres Smelter Plant, Disputada Las Condes Mining Co. Chile (1992, 1995, 1996). Escondida Mining Co., Antofagasta, Chile (1999). Ilo Smelter Plant, Ilo, Perú (2000). Altonorte Smelter Plant, Antofagasta, Chile (2002). Hatch Consulting, Santiago, Chile (2008).

- **Lectures and courses addresses to Universities and Research Centers:** National Faculty of Mines, National University of Colombia, Medellín (1988); Technical University of Kosice, Slovakia (1996); Department of Mining and Metallurgy, Laval University, Quebec, Canada (2000); San Agustín University, Arequipa, Perú (2000, 2002); Universidad Nacional Mayor de San Marcos, Lima, Perú (2002, 2003); Instituto de Tecnología Minera, Buenos Aires, Argentina (2004); Pontificia Universidad Católica de Lima, Perú (2007); Beersheva Technological Center, Beersheva, Israel (2009).

- **Organization of international Conferences and Meetings:** Series of International Conferences on Clean Technologies for the Mining Industry (from 1992 to 2011), Conference on Minor Element Contaminants in Copper Metallurgy (2007), VIII Molten Slag, Fluxes and Salts conference (2009); 2nd International Seminar on Environmental issues in the Mining Industry (2011), Copper 2013 Conference, Santiago, Chile (2013)

- **Short and long term visits:** Laboratoire de Thermodynamique et Physico Chimie Metallurgiques, ENSEEG. **Grenoble, France** (1977 to 1980, 1995) ; Centre de Recherche du Cuivre TREFIMETAUX, **Argenteuil, France** (1980) ; Caraiba Metais S.A. Smelter Plant, Salvador, **Bahía, Brazil** (1987) ; Imperial College of Science, Technology and Medicine, **London, UK** (1989 to 1990) ; University of Manchester, Department of Materials and UMIST, **Manchester, UK** (1990) ; University of Birmingham, Department of Chemical Eng., **Birmingham, UK** (1990, 1994); University of Cambridge, Department of Materials, **Cambridge, UK** (1990, 1995); University of Strathclyde, Department of Metallurgical Processes Eng., **Glasgow, Scotland** (1990); Laboratories and Smelter Plant of Outokumpu in **Pori and Harjavalta, Finland** (1992); Royal Institute of Technology, Department of Theoretical Metallurgy, **Stockholm, Sweden** (1992); Institut für Metallurgie, Technical University of **Berlin**,

Germany (1992); Camborne School of Mines, **Cornwall**/Brunel University, **London**/University of Leeds, **Leeds, UK** (1994); National Physical Laboratory, **London, UK** (1995); Faculty of Metallurgy, Technical University of **Kosice, Slovakia** (1996); Department of Non Ferrous Metallurgy, University of **Miskolc, Hungary** (1996); Chemical Technology Institute, **Prague** and Technical University of **Ostrava, Czech Republic** (1996); University D. Mendeleev, Baykov Institute, **Moscow, Russia** (1996); Institute for Steel and Alloys, **Moscow, Russia** (1996); State Research Centre GINSVETMENT, **Moscow, Russia** (1996); Mining Plants of Rouyn Noranda and Val D'Or, **Quebec, Canada** (1999); Laval University, **Quebec, Canada** (1999, 2000); Mc Gill University, **Montreal, Canada** (1999); Falconbridge Smelter Plant and Technology Centre, **Sudbury, Canada** (2004); CANMET Research Centre, **Ottawa, Canada** (2004); John Emery Geo Technology and Laboratory Centre, **Toronto, Canada** (2004); Montanuniversität, Institut für Entsorgungs- und Deponietechnik, **Leoben, Austria** (2005); University of Cagliari, DIGITA, **Cagliari, Italy** (2005); Beersheva Technological Center, **Beersheva, Israel** (2009); Faculté des Sciences Appliquées, Université de **Liege, Belgium** (2009); Beijing General Research Institute of Mining and Metallurgy, **Beijing, China** (2012); Campuses Polytechnique **Montreal**, Université du Québec à Montreal, Cambrian College of applied Arts and Technology, Laurentian University, **Sudbury**, British Columbia Institute of Technology, Canadian International Institute for Extractive Industries and Development, **Vancouver, Canada** (2014).

- **Participation in evaluation committees** of CONICYT for FONDECYT and FONDEF projects in Chile.

- **Supervision** of more than 50 undergraduate and postgraduate theses.

- **Participation in professional societies:** Chilean Institute of Mining Engineering; Chilean Engineer Society; Andes branch, Canadian Institute of Mining and Metallurgy.