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EDUCATION

Ph.D. in Metallurgy, University of London (Royal School of Mines), 1964.

M.A.Sc. in Metallurgical Engineering, University of British Columbia, 1960

B.A.Sc. (Honors) in Metallurgical Engineering, University of British Columbia, 1959

EMPLOYMENT

2005-present: Professor of Extractive Metallurgy, Department of Mining and Geological Engineering, University of Arizona

1994-2005 Professor, Department of Materials Science and Engineering, University of Arizona

1988-1994 Professor and Associate Head, Department of Materials Science and Engineering, University of Arizona

1986-1987 Professor, Department of Materials Science and Engineering, University of Arizona

1981-1986 Professor and Head, Department of Metallurgical Engineering, University of Arizona

1975-1977 Associate Dean (Academic), Faculty of Engineering, McGill University, Montreal

1972-1981 Professor, Department of Mining and Metallurgical Engineering, McGill University, Montreal

1966-1972 Associate Professor, Department of Mining and Metallurgical Engineering, McGill University, Montreal

1964-1966 Assistant Professor, Department of Mining and Metallurgical Engineering, McGill University, Montreal

1960-1961 Linde Company (Union Carbide), New York, Metallurgical Process Development Engineer

CONSULTING EMPLOYMENT

Various business, government and legal assignments, primarily in the U.S. and Canada but also in South American and around the world

HONORS AND AWARDS

- 1973 American Electroplaters' Society, Silver Medal Paper Award, 1973
- 1981 ALCAN Award of the Canadian Institute of Mining, Metallurgy and Petroleum "in recognition of highly significant contributions to the advancement of metallurgy in Canada"
- 1983 AIME Extractive Metallurgy Lecture, Annual Meeting, Atlanta, GA
- 1985 Sir George Fisher Lecture Award, Australasian Institute of Mining and Metallurgy
- 1991 Fellowship, Canadian Institute of Mining, Metallurgy and Petroleum
- 2003 AIME Mineral Industry Educator of the Year Award "for inspiring students in the pursuit of clarity"

BOOKS

- 1976, 1980, 1994, 2002 Extractive Metallurgy of Copper (also in Spanish)
- 1980 The Iron Blast Furnace: Theory and Practice (also in Chinese, Japanese, Russian and Spanish)
- 1987, 2000, 2003 Flash Smelting: Analysis, Control and Optimization
- 2005 Sulfuric Acid Manufacture: Analysis, Control and Optimization

PATENTS

Canadian Patent 945, 935; April 23, 1974, "Electroplating Aluminum" (with G.A. Capuano) assigned to Canadian Patents and Development Ltd.

United States Patent 3,775,260; November 27, 1973, "Electroplating Aluminum" (with G.A. Capuano) assigned to Canadian Patents and Development Ltd.

Canadian Patent 388, 935; April 1983, "Vacuum Purification of Liquid Metal" (with R. Harris).

U.S. Patent 4,378,242; March 29, 1983 "Vacuum Purification of Liquid Metal" (with R. Harris).

RESEARCH INTERESTS

1. Sulfuric Acid Plant Optimization

Base metal smelters produce more sulfuric acid than metal. It is essential, therefore, that acid manufacture be optimized in terms of energy minimization, gas and liquid flow minimization, corrosion, environmental contamination, and acid purity. Single- and double-absorption plants have been successfully modeled. They are now being tested at industrial smelters.

TEACHING INTERESTS

Extractive metallurgy, particularly the fields of:

1. concentrate production
2. smelting and refining
3. environmental control, especially SO₂ capture
4. leaching, solvent extraction and electrowinning
5. design.