



## Industrial Pyrometallurgy - The Present and Future

Prof. Fathi Habashi

**Short Course:** 26 Nov 2011, Fiesta Americana Condesa All Inclusive Resort, Cancun, Mexico

Participants will learn about pyrometallurgical processes and equipment, about principles and chemical reactions involved, about flowsheets of different processes, etc. The course is designed to help participants in understanding the technology of thermal processing of ores and concentrates to produce pure metals. Participants are encouraged to ask questions and discuss problems during and after the course.

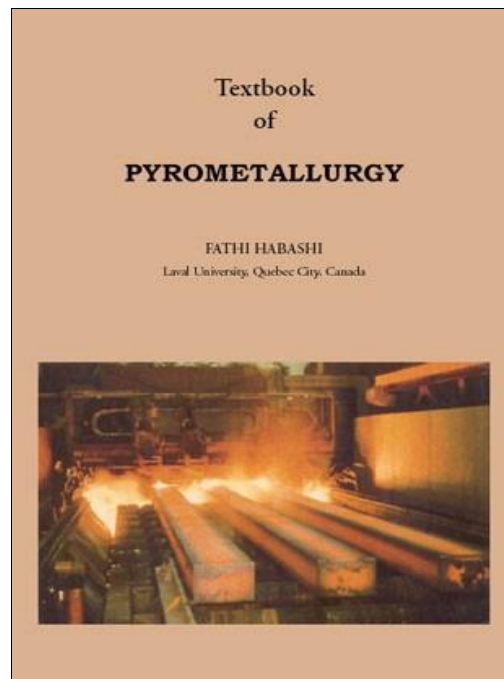
### Who Should Attend

This course would be beneficial to corporation and plant managers, engineers, technologists, researchers and students involved in the development and implementation of pyrometallurgical processes.

### Course Outline

#### **Part I — Introduction**

1. History
  2. Scope
  3. Basic Theory
  4. Pollution Abatement
- #### **Part II — Engineering Aspects**
5. Heat Transfer I
  6. Heat Transfer II
  7. Solid–Gas Separation
  8. Compaction of Powders
  9. Oxidation of a Solid Phase
  10. Oxidation in Molten Phase
  11. Metallothermic Reactions
- #### **Part III — Preliminary Treatment**
12. General
  13. Thermal Pre-treatment
  14. Alkali Fusion
  15. Sulfation of Oxides
  16. Oxidation of Sulfides, Disulfides, and Related Minerals
  17. Matte Formation
  18. Chlorination



## 19. Fluorination

### Part IV — Metal Separation

20. Introduction
21. Reduction: General
22. Reduction of Iron Oxides: Chemical
23. Reduction of Iron Oxides: Technical
24. Reduction of Iron Oxides: Direct Reduction Methods
25. Reduction of Nonferrous Oxides
26. Reduction of Complex Oxides
27. Reduction of Halides
28. Reduction of Sulfides
29. Conversion of Sulfides
30. Other Processes

### Part V — Refining

31. Introduction
32. Selective Oxidation: Iron Refining
33. Selective Oxidation: Steelmaking
34. Selective Oxidation: Copper Refining
35. Precipitation of Impurities from Melt
36. Selective Oxidation: Other Processes
37. Refining by Chemical Transport
38. Physical Methods

### The participants will also receive:

- The participants will receive a copy of the instructor's *Textbook of Pyrometallurgy* [615 pages, hard cover, numerous coloured Figures]
- Certificate of completion
- Lunch and refreshments



### Course Instructor Prof. Fathi Habashi

Fathi Habashi is a Professor Emeritus of Extractive Metallurgy at Laval University in Quebec City. He holds a B.Sc. degree in Chemical Engineering from the University of Cairo (1949), a Dr. techn. degree in Inorganic Chemical Technology from the University of Technology in Vienna (1959), and Dr.Sc. *h.c.* from the Saint Petersburg Mining Institute in Russia (1993). He was a postdoctoral fellow at the Department of Chemistry, University of Vienna (1959–1960), then he held the Canadian Government Scholarship in Ottawa (1960–1962), taught at Montana College of Mineral Science & Technology (1964–1967), then worked at the Extractive Metallurgical Research Department of Anaconda Company in Tucson, Arizona before joining Laval in 1970. In 1998 he was named a Fellow of the Canadian Institute of Mining, Metallurgy, and Petroleum and in 1999 he received its silver medal. He is an Honorary

Professor at the Technical University of Oruro in Bolivia, Honorary Citizen of the city of Oruro, Governor at the Fondation de l'Université Laval, and Member of Le Cercle des Ambassadeurs in Québec City.

**REGISTRATION:** <https://www.flogen.com/FraySymposium/registration.php>

