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International Mineralogical Association



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APPLIED MINERALOGY: PRESENT AND PAST

'Applied mineralogy' covers investigations conducted specifically to solve problems related to the physical and chemical characteristics of minerals and materials. It has a vital role in economic activity and human welfare. The investigations are performed using all available mineral characterization techniques and can involve developing or adapting instruments to make the required measurements. Consequently applied mineralogy covers the complete spectrum of mineralogical activity: exploration for, and exploitation of, base metals, precious metals, base minerals, industrial minerals and materials, building and construction minerals, and carbonaceous materials and their by-products in mining, extractive metallurgy, pyrometallurgy, hydrometallurgy and economic geology. It also includes investigations of environmental materials, refractories, ceramics, cements, alloys, and other products, to solve problems related to the environment, health and criminal activities, and to obtain products for the development and building of equipment and structures.

The importance and recognition of applied mineralogy has grown strongly over the last quarter of a century. Although much research was conducted prior to 1979, most of the results remained in the files of industrial firms and were not available to other mineralogists. In the late 1970s and early 1980s, national groups were formed to promote oral presentations and written accounts. The Process Mineralogy Committee of AIME (American Institute for Mining, Metallurgical, and Petroleum Engineers) is one example of a national group devoted to applied mineralogy. The Process Mineralogy Committee sponsored papers at the component SME (formerly Society of Mining Engineers and currently Society for Mining, Metallurgy, and Exploration) and TMS (formerly The Metallurgical Society and currently The Minerals, Metals and Materials Society) meetings beginning in 1979. Other groups devoted to applied mineralogy were begun about that time in South Africa, Germany, Brazil, Argentina, and elsewhere. With the success of those groups, it became recognized that there was a need for an international body to sponsor papers on applied mineralogy.

In 1979 a group of mineralogists approached the IMA with a request to form a Commission on Applied Mineralogy, but the concept was not approved at that time. Consequently, Sybren Hiemstra and Les Houghton of the Council for Mineral Technology (Mintek) in Johannesburg and other applied mineralogists in South Africa organized the International

Council for Applied Mineralogy (ICAM), and held the first International Congress on Applied Mineralogy (also ICAM) meeting in Johannesburg, South Africa, in 1981. Subsequently, the International Mineralogical Association (IMA) organized two sessions on applied mineralogy and initiated the Commission on Applied Mineralogy (CAM), through the efforts of Tony Naldrett, at the 1986 IMA meeting at Stanford, California. Thus, for the past two decades, applied mineralogists have been confronted with the availability of two organizations devoted to applied mineralogy, but with different terms of reference. ICAM congresses are autonomous, with many sessions on applied mineralogy at each meeting, and involve significant numbers of participants in the disciplines of metallurgy and ceramics. CAM meetings are integrated with IMA meetings, and fewer sessions are conducted on applied mineralogy. Beginning with the 1993 ICAM meeting in Freemantle, Australia, the two groups agreed to collaborate further: ICAM would co-sponsor many CAM sessions at the quadrennial IMA meetings, and CAM would sponsor sessions at the ICAM meetings. ICAM agreed to meet on a quadrennial basis half-way between the regular quadrennial IMA meetings. This relationship was reaffirmed by a vote of applied mineralogists at the CAM business meeting at the recent 8th ICAM meeting in Aguas de Lindoia, Brazil, in September 2004.

The scope of applied mineralogy is very broad, and contributions to CAM and ICAM sessions have evolved with time. Early sessions sponsored by the AIME-Process Mineralogy Committee dealt primarily with applications to the field of metallurgy, including mineralogical studies that led to the solution of beneficiation, hydrometallurgical, and pyrometallurgical problems. The first meeting of ICAM dealt with metallurgical materials and with industrial problems related to ceramic materials. The first IMA-CAM meeting dealt primarily with mineralogical studies of problems

in metallurgy and especially with advanced microbeam techniques. Papers were solicited in four areas: mineral and energy materials exploration, mineral materials (including clay minerals), health and environmental mineralogy, and analytical methods. Early CAM sessions at IMA quadrennial meetings have dealt with mineralogical applications to metallurgical, ceramic, mineral exploration, and environmental problems and with the application of advanced microbeam techniques to those and other problems. More recently papers for CAM and ICAM meetings have broadened to include mineralogical applications to the areas of biomineralogy and biomaterials, advanced materials, industrial minerals, gem materials, and cultural heritage.

The field is by its nature interdisciplinary. For example, the application of a wide variety of mineralogical techniques, including reflected and transmitted light microscopy, cathodoluminescence microscopy, X-ray diffraction, SEM, EPMA, image analysis, numerous other microbeam techniques and tomography, to the study of beneficiation, hydrometallurgical, and pyrometallurgical problems involves close collaboration with metallurgists. Using similar techniques, applied mineralogists interact with exploration geologists to facilitate mineral exploration, and the study of other industrial problems may involve specialists such as ceramists, biologists, and environmentalists.

Currently, CAM and/or ICAM are co-organizing six environmental and applied mineralogy sessions at the 2006 meeting of IMA in Kobe, Japan: bio-geo interface in minerals; mineral-water interactions: from microscopic to macroscopic aspects; environmental and medical mineralogy; clays and zeolites: natural and synthetic materials; crystals, ceramics and glasses with advanced physicochemical properties; and process mineralogy. CAM will be co-sponsoring applied mineralogy sessions at the ninth quadrennial ICAM meeting to be held in Brisbane, Australia, in 2008.

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Commission of Applied Mineralogy