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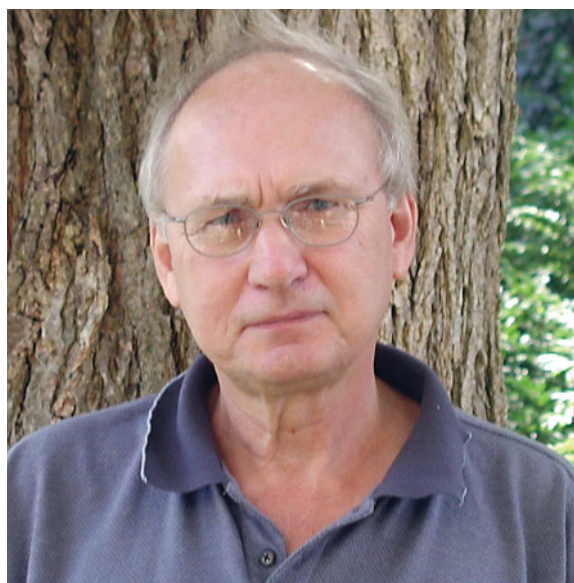
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S³: SULFIDES, STRUCTURES AND SYNCHROTRON LIGHT A TRIBUTE TO MICHAEL E. FLEET



PREFACE

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A symposium entitled “S³: Sulphides, structures and synchrotron light” was held at the 2004 GAC–MAC annual meeting in St. Catharines, Ontario, in honor of Professor Michael E.L. Fleet, who had recently retired from the Department of Earth Sciences, University of Western Ontario. Trying to think of a title for the symposium was quite an exercise, mainly because over the years, both Mike’s own research and that of his graduate students and post-doctoral fellows have covered a diverse and wide range of areas (Table 1). As Mike’s 1997 Past Presidents’ medal citation states, “Mike Fleet is one of the leading Earth Scientists in Canada today, and his expertise spans an unusually wide range of subdisciplines within the Earth sciences”. This is aptly demonstrated by the broad range of papers making up this special issue of *The Canadian Mineralogist*. There are a total of 24 papers spanning topics from crystal-structure analysis, mineralogy and geochemistry of platinum-group minerals and associated sulfides and oxides, to high-pressure mineralogy and spectroscopic methods such as electron paramagnetic resonance (EPR) spectroscopy and assorted synchrotron-based techniques. Mike has worked in all these areas at one time or another. We are just pleased that he didn’t develop an interest in paleontology early in his career!

Mike was educated in the department of Deer, Howie and Zussman at the University of Manchester, but switched from physics to mathematics and geography before deciding on the geology program. He went on to pursue a Ph.D. degree in low-temperature geochemistry under the supervision of Prof. Geoffrey Nicholls, and came to Western as a low-temperature geochemist in 1965. Mike quickly realized that the study of minerals and mineral reactions at the atomic scale requires techniques of X-ray diffraction (XRD). He made good use of available XRD facilities at Western, and became a self-taught X-ray crystallographer, with specialization in ore minerals. Ore minerals, particularly sulfides and oxides, have remained the most consistent thread of Mike’s research.

Although Mike’s research interests have been diverse, throughout his career there has remained a central theme of combining experimental, theoretical and analytical techniques to solve a problem. These aspects of Mike’s approach to doing research have been of great benefit to those of us fortunate to have been his graduate students, post-docs or collaborators. As Mike’s graduate students, this multidisciplinary approach of doing research was the most important lesson passed on to us.

Of course, we wouldn’t say that Mike was the easiest person to work for. For example, Mike was not my (GSH) initial supervisor when first arriving at UWO. When I decided to change topics, he bravely took on this obnoxious colonial. However, after a few weeks he must have felt that he had made a huge mistake. There was the initial language barrier of course; I spoke English and I had no idea what Mike spoke.... some kind of North American dialect. Then periodically he had to sit through one of my spaghetti dinners. I don’t think Mike has ever fully recovered from one of those. And there were the tennis games. To this day, I have never seen anybody so happy as Mike when he was whopping my butt, although it didn’t happen very often! And finally you always had to remember on Saturday mornings that your supervisor was diligently working hard while you recovered from an alcohol-induced brainstorm.

Kidding aside, there is an aspect to working with Mike, whether as his student or as a collaborator, that we think deserves special mention. Mike has never failed to contribute significantly to any collaboration or publication he was associated with; whether it was a need for additional graduate financial support to give one time to write up the results, help with synthesizing an unusual crystalline phase, providing a solution for an apparently intractable problem, or simply bailing a new faculty member out financially when their research funds were exhausted, by covering unexpected expenses: Mike was always there. And for this we thank him.

Regardless of how those of us here today have come to be associated with Mike, all of us can say that we have benefitted greatly from working with him. It has been an honor to have had Mike’s influence on both our professional and personal lives.

We extend special thanks to the local organizing committee of St. Catharines 2004 and the Mineralogical Association of Canada, who provided logistical support and a financial contribution, respectively, to this symposium. We are also very grateful to all contributors, reviewers, Editor Robert F. Martin and Managing Editor Vicki Loschiavo for making this special issue in honor of Michael E. Fleet a reality.

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TABLE 1. SUMMARY OF MICHAEL FLEET'S RESEARCH INTERESTS, COLLABORATORS, AND SELECTED REFERENCES

Topic	Years	Collaborators	References
clay mineralogy, low-temperature and analytical geochemistry	1960 – 1971	G.D. Nicholls*, M.D. Johnston	Fleet (1965, 1966)
Fe–S crystallography and phase relations	1968 – 1982	N.D. MacRae	Fleet (1971, 1982a)
Ni–S crystallography and phase relations	1972 – 1988		Fleet (1972, 1977a, 1987a, 1988)
Zn–S crystallography and solid solutions	1975 – 1987		Fleet (1975a, 1976, 1977b, c, 1987)
crystal chemistry of other sulfides, arsenides, etc.	1970 – 1990	T.A. Mowles, M.D. Osborne, P.C. Burns	Fleet (1974a, 1975b), Osborne & Fleet (1984), Burns & Fleet (1990)
pyroxenes: crystal growth and site occupancies	1974 – 1979	C.T. Herzberg, G.M. Bancroft, L.P. Aldridge, N.T. Arndt	Fleet (1974b, 1975c), Fleet <i>et al.</i> (1978), Aldridge <i>et al.</i> (1978), Arndt & Fleet (1979)
deerite, titanian berthierine, radiation-damaged titanite, reedmergnerite, MHS [†]	1977 – 1997	S.W. Knipe, G.S. Henderson, M. Arima, R.L. Barnett	Fleet (1977, 1992), Arima <i>et al.</i> (1985), Fleet & Henderson (1986), Fleet & Knipe (1997)
preferred orientation of crystals and intergrowths	1980 – 1985	G.A. Bilcox, R.L. Barnett, M. Arima	Fleet <i>et al.</i> (1980), Fleet (1981, 1982c, 1983), Fleet & Arima (1985)
Cr-bearing spinels and magnetite	1981 – 1986	M.D. Osborne, G.M. Bancroft	Osborne <i>et al.</i> (1981, 1984), Fleet (1982b, 1984, 1986a)
gallium and germanium analogue materials	1984 – 1998	G.S. Henderson, C.T. Herzberg, E.D. Crozier, M.D. Osborne, C.M. Scarfe, G.M. Bancroft, D.J. Rogers, J. Barbier, B.L. Sherriff, P.C. Burns, S. Chen, Y. Pan, S. Muthupari, Y. Shao	Fleet <i>et al.</i> (1984), Henderson <i>et al.</i> (1985), Fleet (1987c, 1989, 1991a, b, 1993), Barbier & Fleet (1987, 1988), Fleet & Barbier (1988, 1989), Sherriff & Fleet (1990), Burns & Fleet (1990), Henderson & Fleet (1991a, b), Chen <i>et al.</i> (1994), Fleet & Muthupari (1998)
Fe–(Cu)–(Co)–Ni–S compositions and phase relations	1973 – 2002	K.C. Misra, C.A. Francis, J.R. Craig, W.E. Stone, Y. Pan, N.D. MacRae, S.P. Farrell	Misra & Fleet (1973, 1974), Fleet (1977e), Francis <i>et al.</i> (1976), Stone <i>et al.</i> (1989), Stone & Fleet (1991), Fleet & Pan (1994a), Farrell & Fleet (2002)
olivine–sulfide equilibria	1977 – 1990	N.D. MacRae, C.T. Herzberg, W.E. Stone	Fleet <i>et al.</i> (1977), Fleet & MacRae (1987, 1988), Fleet & Stone (1990)
PGE in Fe–(Cu)–Ni–S system	1991 – 2001	W.E. Stone, R.G. Tronnes, S.L. Chryssoulis, C.G. Weisener, J.H. Crockett, T.-W. Wu, M. Liu	Fleet & Stone (1991), Fleet <i>et al.</i> (1991, 1993, 1999b), Fleet & Wu (1995), Liu & Fleet (2001)
sulfide–silicate partitioning of PGE	1996 – 1999	W.E. Stone, J.H. Crockett, M. Liu	Fleet <i>et al.</i> (1996, 1999a)
platinum-group minerals	1993 – 2005	Y. Chen, Y. Pan, A. Barkov, R.F. Martin, M. Tarkian, N. Angeli, C.M. de Almeida	Chen <i>et al.</i> (1993), Fleet <i>et al.</i> (2002), Barkov <i>et al.</i> (2004)

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arsenian pyrite, gold mineralogy, solubility of gold in fluids	1988 – 2000	P.J. MacLean, J. Barbier, S.L. Chrissyoulis, R. Davidson, C.G. Weisener, S.W. Knipe, A.H. Mumin	Fleet <i>et al.</i> (1988, 1993), MacLean & Fleet (1989), Fleet & Mumin (1997), Knipe & Fleet (1997a, b), Fleet (1998a), Fleet & Knipe (2000)
geology of the Sudbury area	1978 – 1987	M.L. Thomson, R.L. Barnett, R. Kerrich, W.A. Morris	Thomson <i>et al.</i> (1985), Fleet <i>et al.</i> (1987)
mineralogy of the Hemlo area	1989 – 1995	Y. Pan, W.E. Stone, G.E. Ray, N.D. MacRae	Pan & Fleet (1989, 1991, 1992a, b, c, 1995), Pan <i>et al.</i> (1991a, 1993, 1994a)
geochemistry of Archean terranes	1991 – 1997	Y. Pan, H.R. Williams, W.E. Stone, A.H. Mumin, L. Heaman, J.H. Crocket, A.P. Dickin, M.H. Sella	Pan <i>et al.</i> (1991b, 1994b, 1998), Pan & Fleet (1993, 1996, 1999), Stone <i>et al.</i> (1995), Fleet <i>et al.</i> (1997)
Ashanti Gold Belt	1995 – 1996	A.H. Mumin, F.J. Longstaffe	Mumin & Fleet (1995), Mumin <i>et al.</i> (1996)
rare-earth elements in apatite	1994 – 2002	Y. Pan, X. Liu, N. Chen, J.A. Weil, M.J. Nilges	Fleet & Pan (1994b, 1995, 1997a, b), Fleet <i>et al.</i> (2000a, b), Pan <i>et al.</i> (2002), Pan & Fleet (2002)
carbonate apatite	2003 – 2005	X. Liu, P.L. King	Fleet & Liu (2003a, 2004, 2005), Fleet <i>et al.</i> (2004)
high-pressure sodium silicates	1995 – 1998	G.S. Henderson	Fleet & Henderson (1995a, b, 1997), Fleet (1996, 1998b)
XANES spectroscopy of sulfides	1994 – 2005	S.P. Farrell, A.V. Soldatov, A. Kravtsova, I.E. Stekhin, S.L. Harmer, H.W. Nesbitt, J. Nistico, A. Cade	Farrell & Fleet (2000, 2001), Farrell <i>et al.</i> (2002), Kravtsova <i>et al.</i> (2004), Soldatov <i>et al.</i> (2004), Fleet <i>et al.</i> (2005)
XANES spectroscopy of silicates, borates, borosilicates and glasses	1991 – 2002	D. Li, G.M. Bancroft, M. Kasrai, R.A. Secco, X.H. Feng, K.H. Tan, S. Muthupari, S. Prabakar, X. Liu, G.S. Henderson	Kasrai <i>et al.</i> (1991), Li <i>et al.</i> (1993, 1994, 1995), Fleet <i>et al.</i> (1997), Kasrai <i>et al.</i> (1998), Fleet & Muthupari (2000a, b), Fleet & Liu (2001a), Henderson <i>et al.</i> (2002, 2003)
other studies on glasses and melts	1981 – 2005	H.W. Nesbitt, G.S. Henderson	Nesbitt & Fleet (1981), Henderson & Fleet (1995)
high-pressure rare-earth silicates	2001 – 2005	X. Liu	Fleet & Liu (2001b, 2003b, c)
micas	2003		Fleet (2003)

* supervisor, Ph.D. thesis. † Magnesium hydroxide sulfate hydrate.

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