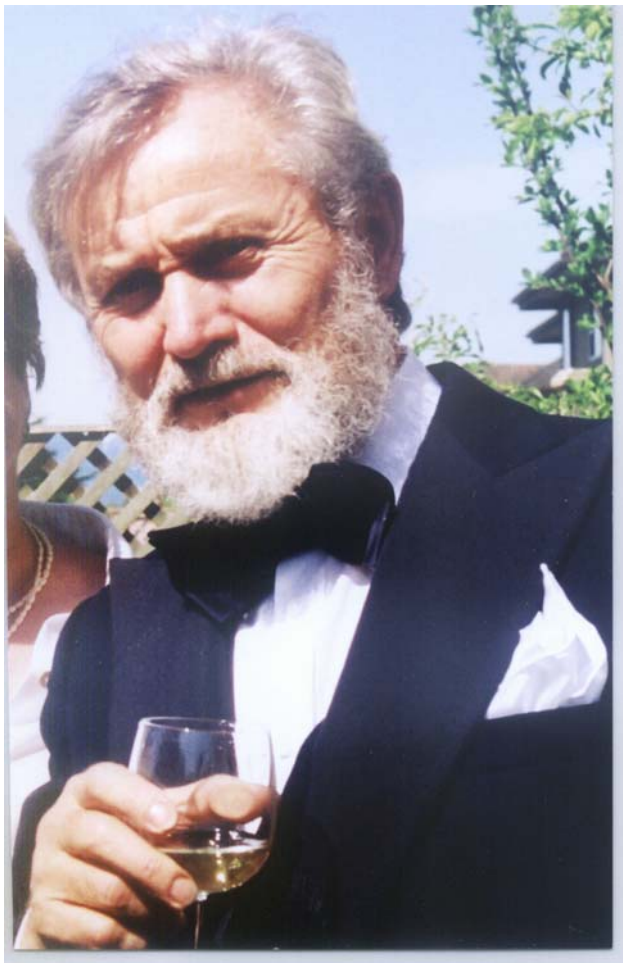

In honor of Professor Janusz S. Laskowski on the 40th Anniversary of the Physicochemical Problems of Mineral Processing

Although officially the first Symposium took place on 18th of February of 1966, the truly first Symposium was held two years earlier in 1964 [see Wspomnienie, *Physicochemical Problems of Mineral Processing,* No. 27, pp. 9-11 (1993)]. The year 2004 thus marks the 40th anniversary of the Symposia, and it coincides with 45th anniversary of Professor Laskowski's scientific activities. It is the 20th year of publication of Coal Preparation international journal which was founded by Professor Laskowski. This year, he and his wife Barbara celebrated 40 years of

marriage. With all these facts in mind the Organizing Committee is pleased to announce that this 41st Symposium in the series Physicochemical Problems in Mineral Processing, which deals with all aspects of mineral processing and is the longest symposia series in Poland and probably in the Central and Eastern Europe, has been dedicated to Professor Janusz Laskowski.

Janusz Laskowski graduated B.Sc. in chemistry from the Silesian University of Technology in 1956, and obtained M.Sc. degree in chemical engineering in 1958. Following his father's advise who kept saying that "colloid chemistry is a future of mineral processing" he decided eventually that surface chemistry was what he wanted to go into more deeply. He had a good fortune to hear Academician Peter Aleksandrovich Rehbinder's lectures on colloid chemistry when he ended up as a postgraduate student at the Lomonosov University in Moscow in 1961/62. Peter Aleksandrovich quickly learned that his student from Poland was spending a lot of time in libraries studying everything that Rehbinder had ever published on wettability and he arranged a special program for his student with the experimental work carried out under the supervision of Professor V.I. Klassen at the Mining Institute of the USSR Academy of Sciences. Having forged a strong bond with Klassen, Janusz translated his monograph on *"Coal Flotation"* (the book was published in Poland by Slask in 1966). Under Professor Klassen's guidance he started working on his dissertation on *Coal Salt Flotation* which was defended at the Silesian University of Technology, Gliwice, in 1963. He completed his thesis of Habilitation in 1966. In 1967, Janusz Laskowski left Gliwice for a one-year postodoctoral period as a Leverhulme Trust Postodoctoral Research Fellow in Dr. J.A. Kitchener's surface chemistry lab in the Department of Mining & Mineral Technology, Imperial College, London. This, we think, explains pretty well the dedication in Professor Janusz Laskowski's recent monograph on *Coal Flotation and Fine Coal Utilization* (Elsevier, 2001) to my professors: Tadeusz Laskowski, Villi Ivanovich Klassen and Joseph A. Kitchener".

All good things must come to an end and not all of Janusz and Barbara's life has been roses. In 1971 their daughter died at the age of 4 years. But suddenly during this devastating period Professor Laskowski received an invitation from Professors Jorge Goldfarb and Carlos Diaz to join Universidad de Chile as a visiting professor. Warm welcome by Goldfarb's team of young enthusiasts, beauty and splendid climate of Chile, excellent wines, and a son, Kornel, brought back form Chile, played a decisive role in the long recovery process. Chile became a second motherland for Professor Laskowski and he has been maintaining up to now his contacts with this country and visits it quite frequently. Invited by Professor Jan Leja, on his return from Chile in 1972 he stopped over for a few

lectures at the University of British Columbia in Vancouver, the city which ten years later became his home.

In addition to building up active research groups first at the Silesian University of Technology and later at the Wroclaw Technical University, he made a number of other important contributions. After launching the *"Physico-Chemical Problems of Mineral Processing"(*www.ig.pwr.wroc.pl/minproc/journal/) symposia (he was chairing the Organizing Committee until 1980) he kept putting together every year a proceedings volume (the first number of Physicochemical Problems of Mineral Processing appeared in Gliwice in 1967). In 1964, in collaboration with Dr. Bortel and Dr. Buntner he wrote a textbook on *Physicochemical Principles and Technology of Flotation* published by the Silesian University of Technology in 1964. In 1969, published his book on *Physical Chemistry in Mineral Processing,* Slask, 1969.

In Chile, he used this book to teach surface chemistry courses at Universidad de Chile in Santiago, and at Universidad de Concepcion where was invited by Dr. Fernando Concha. Following Professor Concha's suggestion he updated his book which was then translated into Spanish and published by University of Concepcion in 1974 *(Fundamentos Physicoqumicos de Mineralurgia)*. For many years he was a member of Mineral Processing Section of the Mining Committee of Polish Academy of Sciences, and Committee of Physical Chemistry of Surfaces. Since 1970, Professor Laskowski was a member of the International Committee for International Mineral Processing Congresses, chaired the 13th International Mineral Processing Congress in Warsaw in 1979 and edited the two-volume proceedings (*Mineral Processing – Proc. 13th Int. Mineral Processing Congress*, Elsevier, 1980) and three volumes of the round-table seminars.

The 13th International Mineral Processing Congress turned out to be a very important event for the Laskowski's family. Directly after the 13th Congress Janusz Laskowski was invited by Professor Tom Meloy to attend his Engineering Foundation Conference, and invited by Professor Douglas Fuerstenau he joined University of Berkeley as a visiting professor. Because of the martial law in Poland he postponed his return to the homeland, in 1982 joined the University of British Columbia as a full professor of mineral processing, and settled in Vancouver with his wife Barbara and two sons Kornel (9 years) and Cyprian (3 years). His Vancouver career has been interspersed with several sabbatical leaves: with Prof. Jean Cases's Surface Chemistry Group at Ecole Nationale Superieure de Geologie, Nancy, France in 1987/88, and with the Department of Chemical Engineering of the University of Cape Town in 1996.

On becoming a faculty member at UBC, Professor Laskowski entered a dynamic situation at the Department of Mining and Mineral Processing which with Professors Jan Leja, Andrew Mular and George Poling was one of the world

leading centers in the area of mineral processing. Professor Laskowski took over and totally revised teaching of the 3rd year flotation coarse making colloid chemistry fundamentals of an integral part of it. The new course included not only sulfide flotation as before, but also flotation of oxidized Cu-Zn-Pb ores, flotation of phosphates, and extremely important in western Canada potash ore flotation and coal flotation. He introduced a new elective courses "Coal Preparation" and "Surface Properties" and also a graduate course "Fine Particle Processing". And then, again, he began the process of building from scratch his new research group. Several post-docs and visiting scholars participated in this process: Dr. Jaime Solari (from Chile, Ph.D. from Imperial College) Professor Sergio Castro from University of Concepcion (Chile), Dr. Suzan Partridge (Ph.D. from Bristol University), Dr. Qi Dai (Ph.D. from Tohoku University, Japan), Dr. S. Subramanian (from Indian Institute of Science), Dr. Qun Wang (Ph.D. from the Helsinki University of Technology), Dr. Alexander Lopez-Valdivieso (professor from Universidad Autonoma de San Luis Potosi, Mexico; Ph.D. from the University of Berkeley), Dr. Qi Liu (who obtained Ph.D. working under Professor Laskowski at UBC and after spending 5 years with the University of Wuhan, China, returned to Canada as a visiting scholar), Dr. Ana B. Garcia (from Instituto National del Carbon, Oviedo, Spain), Dr. Agnieszka Sworska (from the University of Maria-Curie Sklodowska, Poland), Dr. Simon Yuan (Ph.D. from Lulea University of Technology), Dr. Feridun Boylu from Istanbul Technical University.

Professor Laskowski became a very active member of SME and since 1982 presented his papers at all SME Annual Meetings and organized and chaired many sessions. He served as a member of the SME Mineral Processing Fundamentals Committee and also chaired it. In Canada he became a very active member of the Metallurgical Society of Canadian Institute of Mining. In 1995, initiated a new series of UBC-McGill international symposia on Fundamentals of Mineral Processing and chaired the first Symposium on "Processing of Hydrophobic Minerals and Fine Coal", Vancouver, August 1995; jointly with George Poling he edited the proceedings volume *"Processing of Hydrophobic Minerals and Fine Coal"* published by CIM Metallurgical Society in 1995. He chaired the 3rd Symposium on *"Polymers in Mineral Processing"*, Quebec City, 1999, and edited the proceedings volume which appeared under the same title. This year he is organizing and editing proceedings volume of the 5th UBC-McGill Int. Symposium on *"Particle Sized Enlargement in Mineral Processing"* (it will take place in Hamilton, Ontario, August 22-25, 2004). Over the last four years he chaired the Mineral Sciences and Engineering Section of the Metallurgical Society of CIM.

When J.A. Kitchener retired Janusz Laskowski jointly with John Ralston put together a special volume which appeared in 1992 under J.S. Laskowski and J. Ralston's editorship (*"Colloid Chemistry in Mineral Processing"*, Elsevier, 1992). When Professor Jan Leja retired after 20 years with the University of British Columbia, Professor Laskowski edited a volume *"Frothing in Flotation"* in his honor (published by Gordon and Breach in 1989). This book was followed by *"Frothing in Flotation II"*, edited jointly with E.T. Woodburn and published by Gordon and Breach in 1998. *"Frothing in Flotation III"*, edited jointly with C.T. O'Connor and J.P. Franzidis, appeared as a special issue of International Journal of Mineral Processing, Vol. 64, Nos. 2-3 (2002).

Professor Laskowski jointly with Professor David Boger organized the Engineering Foundation Conference on *"Rheology in the Mineral Industry"*, San Diego, February, 1997. The papers presented at this conference appeared in a special issue of Mineral Processing and Extractive Metallurgy Review (Vol. 20, Nos. 1-3, 1999), edited by D.V. Boger and J.S. Laskowski, and in a special issue of Coal Preparation (Vol. 18, Nos. 3-4, 1997) edited by J.S. Laskowski and H. Usui. This conference was followed by the 2nd Engineering Foundation Conference on *"Rheology in the Mineral Indiustry",* Hawaii, March, 1999, which he co-chaired.

In 1984, Professor Laskowski founded *"Coal Preparation"* international journal and has been its editor-in-chief since. Over years, he was a dedicated member of the Editorial Boards of several scientific journals (Minerals Science and Engineering, Colloids and Surfaces, Mineral Processing and Extractive Metallurgy Review, International Journal of Mineral Processing).

With Dr. J. Drelich (Michigan University of Technology) he co-chaired the Symposium "Apparent and Microscopic Contact Angles" held in conjunction with the 216th National American Chemical Society Meeting, Boston, August 24-27, 1998. Jointly with J. Drelich and K.J. Mittal he edited the volume *"Apparent and Microscopic Contact Angles"* published by VSP in 2000.

Since translating Klassen's monograph on Coal Flotation from Russian into Polish (in 1966) Professor Laskowski was collecting data for his own monograph on the subject which in comparison with Klassen's monograph was much enlarged and also includes fine coal utilization. The book appeared in 2001 (*"Coal Flotation and Fine Coal Utilization"*, Elsevier in 2001).

In 2001, Professor Laskowski officially retired from University of British Columbia and we have noticed that now it is much more difficult to catch him in Vancouver. He developed a strong collaboration with Department of Chemical Engineering of the University of Cape Town (UCT website lists him as a visiting professor), and with the Helsinki University of Technology, and he maintains a very active group of graduate students at UBC. In all, he supervised: 10 Ph.D.

Theses in Poland, 1 Ph.D. Thesis and 1 M.Sc Thesis in Chile, 7 Ph.D. Theses and 5 M.A.Sc. Theses in Canada, and recently 1 M.Sc. Thesis in Argentina (Universidad Nacional de San Juan). We have learned that over the last few years Professor has been teaching many short-courses:

- *Use of Polymers in Mineral Processing,* Universidad Autonoma de San Luis Potosi, Mexico, May, 2004.
- Use of Polymers in Mineral Processing, University of Concepcion, Chile, December, 2003.
- *Coal Flotation and Fine Coal Utilization,* Mintek, Johannesburg, South Africa, November, 2003.
- *Use of Polymers in Mineral Processing,* Mintek, Johannesburg, South Africa, November, 2003.
- *Use of Polymers in Mineral Processing,* University of Cape Town, South Africa, October, 2003.
- *Surface Chemistry,* Helsinki University of Technology, Finland, May, 2003.
- *Surface Chemistry,* Helsinki University of Technology, Finland, May,2002.
- *Flotation Fundamentals*, Saskatchewan Potash Corporation, Saskatoon, Canada, March 4-5, 2002.
- *Frothers and Their Use in Flotation,* Florida Institute of Phosphate Research, Lakeland, Florida, USA, August 9, 2001.
- *The Use of Polymers in Mineral Processing,* Outokumpu, Finland, September, 1999.
- *Coal Flotation: Fundamentals and Engineering,* Sparwood, B.C., Canada, April 3-4, 1997.

Professor Laskowski has published more than 200 papers in refereed journals and conference proceedings based on research conducted in Poland, Russia, Chile, USA, Canada, South Africa and Finland. Since the 10th International Mineral Processing Congress in 1973, Professor Laskowski has presented papers at all International Mineral Processing Congresses (with the exception of the 14th IMPC in 1982). Since the 10th International Coal Preparation Congress in Edmonton in 1986 he has presented papers at all Coal Preparation Congresses. Below we list some of his significant findings:

- improvement of froth flotation in the presence of salt results from collapsing of hydration layer shielding coal particles and nucleation of microbubbles on coal surface in concentrated salt solutions (various papers between 1962 and 2001)
- instability of water films of a certain thickness on hydrophobic solids is fundamentally due to a deficiency of hydrogen bonding in these films compared with liquid water (J.S. Laskowski and J.A. Kitchener, The hydrophilic hydrophobic transition on silica, J. Coll. Interface Sci., 29 (1969), p.670. By some, this paper is considered "one of the most elegant

demonstrations of the inadequacy of the DLVO theory" (R.M. Pashley, in Colloid Chemistry in Mineral Processing, Elsevier , 1992, p.104).

- with Bern Klein developed a viscometer for studying unstable non-Newtonian suspensions (B. Klein, J.S. Laskowski and S.J. Partridge, A New Viscometer for Rheological Measurements on Settling Suspensions, Journal of Rheology, 39 (1995) p. 827) and using this equipment established with Y.B. The relationship between magnetite particle size distribution, and stability and rheology of magnetite aqueous suspensions, and the effect of rheological properties of such a system on separation efficiency of dense medium separators (R.Y. He and J.S. Laskowski, Dense Medium Cyclone Separation of Fine Particles – Parts I and II, Coal Preparation, 16 (1995) p. 1 and p. 27; and J.S. Laskowski, Dense Medium Rheology and Its Effect on Dense Medium Separation, Advances in Gravity Concentration (R.Q. Honaker amd W.R. Forest, eds.), SME, 2003, pp. 55- 70).
- -in the 80' he studied weak electrolyte type flotation collectors (e.g. fatty acids, primary amines) and described the properties of colloidal species that appear over given pH ranges in aqueous solutions containing such surfactants. These species exhibit clear iso-electric-points and depending on pH may either be positively or negatively charged. It was shown that the properties of the mineral systems with a weak electrolyte collector added cannot be explained without taking into account such species (S.H. Castro, R.M. Vurdela and J.S. Laskowski, The Surface Association and Precipitation of Surfactant Species in Alkaline Dodecyalime Hydrochloride Solutions, Colloids and Surfaces, 21 (1986) p. 87; J.S. Laskowski, Weak Electrolyte Collectors, Advances in Flotation Technology (B.K. Parekh and J.D. Miller, eds.), SME, 1999, pp. 59-82. By the way, for the latter work Professor Laskowski won the Arthur F. Taggart Award of SME in 2000.
- in the second half of the 1980' initiated with Qi Liu, who was at that time his Ph.D. student, fundamental studies on the mechanism of adsorption of polysaccharides (dextrins) onto mineral surfaces. The postulated mechanism, which involves a chemical in nature interaction between OH groups on mineral surfaces and OH groups in glucose ring, has been confirmed by other researchers and may eventually lead to the development of non-toxic modifiers for flotation of polymetallic sulfide ores (Q. Liu and J.S. Laskowski, The Role of Metal Hydroxides at Mineral Surfaces in Dextrin Adsorption – Parts I and II, Int. Journal of Mineral Processing, 26(1989) p. 297; 27 (1989) p. 147; Journal of Colloid and Interf. Sci., 130 (1989) p.101 and subsequent papers with G. Nyamekye, and with M. Subramanian).

- over the last five years in search for more scientific roots he has returned to the studies on the properties of flotation frothers carried out in the 70' with Janusz Lekki, and with Sam Cho introduced the concept of the critical coalescence concentration (CCC), described the correlation between CCC and DFI (Dynamic Foamability Index) (Y. S. Cho and J.S. Laskowski, Effect of Flotation Frothers on Bubble Size and Foam Stability, Int. J. Miner. Process, 64 (2002) p.69) and showed how these indices can be used to classify the flotation frothers (J.S. Laskowski, Fundamental Properties of Flotation Frothers, 22nd Int. Mineral Processing Congress, Cape Town, 2003, Vol. 2, pp. 788-797).

Janusz Laskowski's interests extend far beyond his professional life; he is an expert camper and hiker, good skier, lake swimmer and keen tennis player. After many years of studying impressionists at many art galleries around the world, a few years ago he decided to start painting for relaxation. According to his own words "he works in oil". He has recently told us that this brought about an acclamation of his neighbors and colleagues during the recent garden party in his house celebrating 40th Anniversary of his and Barbara marriage. The guests admired with interest the fresh painting of their house and on hearing that Janusz did it himself some commented that "this time this job was done much better than a few years ago", and some others were delighted that "Janusz finally found a well paid job".

More about Professor Laskowski and his accomplishments can be found at www.mining.ubc.ca/department/faculty/laskowski.

Andrzej Łuszczkiewicz
Jan Drzymala
Zygmunt Sadowski