

Ulrich von Sacken

Education

1980 – 1985 Ph. D. Physics, University of Waterloo, Waterloo, Ontario, Canada

1977- 1980 M. Sc Physics, University of British Columbia, Vancouver, British Columbia, Canada

1973 - 1977 B.Sc. (Hon) Physics, University of British Columbia, Vancouver, British Columbia, Canada

Employment History

von Sacken Consulting Ltd., Sidney, BC

June 2013 – present Consultant

BAK Battery Canada Ltd., Port Coquitlam, BC

2007 – April 1, 2013 VP – Technology

E-One Moli Energy, Maple Ridge, BC

1994 – 2007 General Manager of R&D

1990 – 1994 Manager, Materials Development

1987 - 1990 Research Scientist

National Research Council of Canada, Ottawa, Ontario

1986 – 1987 Research Fellow

More than 30 years of experience with the development, design and manufacture of lithium ion cells.

In the early part of my career at Moli Energy I started investigating the safety of lithium cells and used ARC to study the fundamental instability of the lithium metal electrode and the exothermic reactions of lithiated graphite and charged cathode materials.

During my tenure as General Manager of R&D at Moli Energy we were the first to commercialize Mn spinel based Li-ion cells, high energy 2.4Ahr 18650 cells and 26650 Li-ion power cells.

More recently, while at BAK Battery I became familiar with the realities of Li-ion manufacturing in China and was increasingly involved with product quality and reliability issues for cylindrical, prismatic and polymer cells.

Both at Moli and BAK I was usually the lead investigator for failure analysis. The types of failures ranged from relatively benign issues such as self-discharge to serious incidents such as fires involving multicell packs. I have been involved in more than 150 failure analysis investigations including dozens of a serious nature.

Publications

Qiming Zhong and U von Sacken, "Crystal structures and electrochemical properties of $\text{LiAl}_y\text{Ni}_{1-y}\text{O}_2$ solid solution" *Journal of Power Sources*, **54**, 221-223 (1995)

U. von Sacken, E. Nodwell, A. Sundher and J.R. Dahn, Comparative Thermal Stability of Carbon Intercalation Anodes and Lithium Metal Anodes for Rechargeable Lithium Batteries, *Journal of Power Sources*, **54**, 240-245 (1995).

Tao Zheng, Yinghu Liu, E.W. Fuller, Sheilla Tseng, U. von Sacken and J.R. Dahn, Lithium Insertion in High Capacity Carbonaceous Materials, *J. Electrochem. Soc.*, **142**, 2581-2590 (1995).

U. von Sacken, E. Nodwell, A. Sundher and J.R. Dahn, Comparative Thermal Stability of Carbon Intercalation Anodes and Lithium Metal Anodes for Rechargeable Lithium Batteries, *Solid State Ionics*, **69**, 284-290 (1994).

J.R. Dahn, E.W. Fuller, M. Obrovac, U. von Sacken, Thermal Stability of Li_xCoO_2 , Li_xNiO_2 and $\lambda\text{-MnO}_2$ and Consequences for the Safety of Li-ion cells, *Solid State Ionics*, **69**, 265-270 (1994).

J.R. Dahn, A.K. Sleight, Hang Shi, J.N. Reimers, B.M. Way, Q. Zhong, U. Von Sacken, Carbons and Graphites as Substitutes for the Lithium Anode, in *Lithium Batteries; New Materials, New Perspectives*, ed. by G. Pistoia, Elsevier - North Holland, Dec. pp. 1-47 (1993).

J.N. Reimers, J.R. Dahn and U. Von Sacken, Effect of Impurities on the Electrochemical Properties of LiCoO_2 , *J. Electrochem. Soc.*, **140**, 2752-2754 (1993).

J.N. Reimers, J.R. Dahn, J.E. Greedan, C.V. Stager, G. Liu, I. Davidson and U. von Sacken, Spin-Glass Behaviour in the Frustrated Antiferromagnet LiNiO_2 . *J. Solid State Chemistry*, **102**, 542 (1993).

J.R. Dahn, U. von Sacken, H. Al Janaby and M.W. Juzkow, Rechargeable LiNiO_2 /Carbon Cells, *J. Electrochem. Soc.*, **138**, 2207 (1991).

I. Davidson, J.E. Greedan, U. von Sacken, C.A. Michael and J.R. Dahn, Structure of $1\text{TLi}_2\text{NiO}_2$ from Powder Neutron Diffraction, *Solid State Ionics*, **46**, 243-247 (1991).

J.R. Dahn, U. von Sacken and C.A. Michael, Structure and Electrochemistry of $\text{Li}_{1+y}\text{NiO}_2$ and a New Li_2NiO_2 Phase with the $\text{Ni}(\text{OH})_2$ Structure, *Solid State Ionics*, **44**, 87-97 (1990).

Rosamaria Fong, U. von Sacken and J.R. Dahn, Studies of Li Intercalation into Carbons Using Non-Aqueous Electrochemical Cells, J. Electrochem. Soc., **137**, 2009-2013 (1990).

U. von Sacken and J.R. Dahn, TGA/MS Studies of the Thermal Decomposition of NH_4VO_3 , J. Power Sources, **26**, 461-465 (1989).

Granted Patents

J.S. Xue, A.M Wilson, J.R. Dahn, Y. Liu, U. von Sacken, Qiming Zhong, Tao Zheng, 'Pregraphitic carbonaceous insertion compounds and use as anodes in rechargeable batteries', United States Patent #6,316,144 (granted Nov 13, 2001)

Tatsuji Numata, Junji Tabuchi, Yuichi Kumeuchi, Atsushi Ochi, Ulrich von Sacken, Zoon Kuimii, 'Positive Electrode Active Material for Organic Electrolyte Secondary Battery', JP3363007 (granted Oct 25, 2002)

Yu Wang, Meiji Zhang, Ulrich von Sacken and Brian Way, 'Additives for improving cycle life of non-aqueous rechargeable lithium batteries', U.S. Patent #6,045,948 (granted Apr 4, 2000), EP0903798 (granted Oct 17, 2001), JP11149943 (granted June 2, 1999) CA2215756 (granted Apr 4, 2006)

Huanyu Mao and Ulrich von Sacken, 'Aromatic monomer gassing agents for protecting non-aqueous lithium batteries against overcharge', U.S. Patent #6,033,797 (granted Mar 7, 2000), U.S. Patent #5,776,627 (July 7, 1998) JP3061759 (granted Apr 28, 2000), EP0776058 (granted Aug 29, 2001)

Huanyu Mao, Ulrich von Sacken and Jan Reimers, 'Additives for improving cycle life of non-aqueous rechargeable lithium batteries' U.S. Patent #5,891,592 (granted Apr 6, 1999), JP10223258 (granted Aug 21, 1998), EP0856901 (granted May 15, 2002)

Qiming Zhong, Ulrich von Sacken and Jan Reimers, 'Method of Reducing the Surface Area of Carbonaceous Powders' JP10059703 (granted Mar 3, 1998) , CA2176452 (granted Dec 2, 2008)

Qiming Zhong and Ulrich von Sacken, 'Use of P_2O_5 in non-aqueous rechargeable lithium batteries' U.S. Patent #5,789,105 (granted Aug 4, 1998) CA2150877 (granted Apr 16, 2002)

Ulrich von Sacken, Wendy Chow and Allen Shkuratoff, 'Battery with improved safety during mechanical abuse' U.S. Patent #5,747,188 (granted May 5, 1998).

U. von Sacken, Q. Zhong, Yuan Gao and J.R. Dahn, 'Methods for Preparing $\text{Li}_{1+x}\text{Mn}_{2-x}\text{O}_4$

with Improved High Temperature Electrochemical Performance', CA 2164385 (granted June 13, 2000); US Patent #5,700,597 (granted Dec. 23, 1997).

Qiming Zhong and Ulrich von Sacken, 'Low viscosity electrolyte comprising P2O5 for use in non-aqueous rechargeable lithium batteries' U.S. Patent #5,650,245 (granted July 22, 1997)

J.R. Dahn, U. von Sacken and R. Fong, 'Lithiated Nickel Dioxide and Secondary Cells Prepared Therefrom', U.S. Patent 5,264,201 (granted Nov. 23 1993). Filed in Canada, March 19, (1991) #2,038,631-2 pending. Filed in Japan, May 20, (1991), Hei-3-145,396. EP0468942 (granted Dec 1, 1999), EP0702421 (granted Dec 16, 1998).

Ulrich von Sacken, 'Hydrides of lithiated nickel dioxide and secondary cells prepared therefrom' U.S. Patent #5,180,574 (granted Jan 19, 1993)

U. von Sacken, T. Van Buuren and J.R. Dahn, 'VO₂(B) Metastable Phase Cells and Process', U.S. Patent #4,965,150, (granted Oct. 23 1990).