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**Personal Summary**

Colleagues say that I am an extremely practical engineer, scientist and businessman. They claim I am equally at home presenting at a scientific conference, creating a SWOT analysis in a business meeting, or anything in between. They would give me high marks for being able to solve complicated problems by breaking them down into manageable pieces and for having the gift of being able to explain complex concepts in a clear and succinct manner.



Looking back, I have been fortunate to work with some very talented people. Some noteworthy outcomes: claustrophobic people and animals can have an open-MRI without fear or injury, hockey players avoid serious injury when they hit the goalposts because of a breakaway magnetic device, magnetic measurements can be done more quickly and easily with a Helmholtz coil and NdFeB alloys can be broken up easily with hydrogen decrepitation. Looking forward, we have only scratched the surface of what we can do with magnetic materials.

**SPONTANEOUS MATERIALS, Denver, CO and Fishers, IN [2001 to date]**

*Owner*

A consultancy specializing in solving client's problems with magnetic materials and the rare earths, as well as a resource for technical training and writing.

**Metropolitan State University of Denver [2013, 2015 to date]**

*Affiliate Faculty, Mechanical Engineering Technology*

**St. OLAF COLLEGE, Northfield, MN [2014]**

*Visiting Assistant Professor of Physics*

**MOLYCORP, INC., Greenwood Village, CO, Anderson, IN, Fairfield, NJ, White Plains, NY (Became Neo Performance Materials in 2016)**

*Director Magnet Business [2010 to 2013]*

Responsible for magnet processes for the "Mine to Magnetics" business strategy, including due diligence projects and applications support.

*Applications Engineer [1997-2001]*

Worked with customers to resolve material selection, design, coating, adhesive and magnetic testing issues.

Created a database of information and resources that allowed most questions to be answered in less than an hour.

Updated technical literature, application bulletins and data sheets.

Chaired the Technical Committee of the International Magnetics Association, which rewrote the Standard for Permanent Magnets Materials, MMPA-0100-00.

*Metallurgist-Technical Sales and Development [1988 to 1997]*

Sold and promoted new commercial applications of the rare earths.

Managed over 130 North American accounts, annual sales from \$15 to \$20 million.

Resolved product specification, quality, scheduling, pricing and contract issues.

Application areas covered: permanent magnets, glass polishing compounds, petroleum and environmental catalysts, thermal barrier coatings, nickel metal hydride batteries, advanced ceramics and ferroalloys.

**ALMA COLLEGE, Alma, MI [2006 to 2007]**

*Visiting Assistant Professor of Physics*

**MAGNETICS MAGAZINE, Greenwood Village, CO [2005 to date]**

*Contributing Editor*

Writer of the Spontaneous Thoughts column

**MARIAN COLLEGE, Indianapolis, IN [2002 to 2010]**

*Adjunct Lecturer in Physics*

**HITACHI MAGNETICS CORP., Edmore, MI [1984 to 1988]** (closed July 2005)

*Senior Development Engineer*

Developed new NdFeB magnet alloys with improved thermal stability.

Liaison to Hitachi research group in Kumagaya, Japan.

Established vacuum induction melting of rare earth alloys, for both research and production.

Invented hydrogen decrepitation, the standard process to pulverize NdFeB ingots.

Developed internal training and a seminar to promote the use of NdFeB magnets with major customers.

**CRUCIBLE MAGNETICS, Elizabethtown, KY [1982 to 1984]** (Became Vacuumschmelze and ceased production in December 2003)

*Manager of Rare Earth Technology*

Responsible for SmCo magnet production, quality control, applications.

Assisted in technology transfer from TDK Corporation, Japan.

Modernized an ancient array of magnetic test equipment. Examples: automated density measurement, Helmholtz coils with digital solid state fluxmeters.

Introduced the use of computers in applications, design and production.

Started up the first VFS vacuum sintering furnace, in record time.

**RECOMA, INC., Fairfield, NJ [1979 to 1982]** (Became Precision Magnetics)

*Manager of Materials Development, Design Engineering and Quality Control*

Technical manager of a small start-up company to produce and market SmCo<sub>5</sub> magnets in North America, using technology developed by Brown Boveri (now ABB) in Switzerland.

Turned around failed quality program, winning approval from Northrup.

Interfaced with customers, source inspectors, auditors and quality managers.

**EDUCATION**

**UNIVERSITY OF PENNSYLVANIA, Philadelphia, PA [1974 to 1979]**

*Research Fellowship in Metallurgy and Materials Science*

Ph.D.: Magnetocrystalline Anisotropy, Magnetostriction and Saturation Magnetization of SmCo<sub>5</sub> Single Crystals

M.S.: High Field Magnetic Measurements on Sintered SmCo<sub>5</sub> Permanent Magnets

Techniques used: torque magnetometer, vibrating sample magnetometer, strain gages, high field Bitter magnets.

Teaching Assistant. Advisor: C. D. Graham, Jr.

**LAFAYETTE COLLEGE, Easton, PA [1969 to 1973]**

B.S. Physics with Honors, nine semesters of Mathematics.

Set up high pressure viscometer. Teaching Assistant. Physics Club President.

**Professional Engineer (Pennsylvania PE027314E, Colorado PE.0048750)**

**Publications** (most may be found at [www.spontaneousmaterials.com/papers.htm](http://www.spontaneousmaterials.com/papers.htm))