Richard T. Oakley

FRSC, Professor of Chemistry

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Research Interests:

Synthesis and solid state transport properties of open shell inorganic and organic ring systems. Chemistry, electrochemistry, EPR spectroscopy, electronic and magnetic properties of molecular radicals. Heavy atom radicals as multifunctional molecular conductors and magnetic materials.

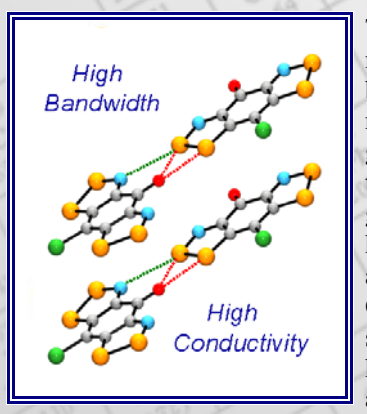
Academic Background:

B.Sc., 1969, Honours Chemistry, University of British Columbia

M.Sc., 1970, Inorganic Chemistry, University of British Columbia

Ph.D., 1976, Inorganic Chemistry, University of British Columbia

NSERC Post-doctoral Fellow, 1976-78, Univ. of Wisconsin and Stanford University



The design and synthesis of single component molecular conductors and magnetic materials based on neutral π-radical building blocks represents an appealing alternative to the generally accepted approach of utilizing charge transfer between two components as a means of generating charge and spin carriers. Radicals, however, tend to dimerize, and even when association is suppressed, the high on-site Coulomb repulsion *U* leads to a Mott insulating state. In our research we build heavy atom heterocyclic radicals in which the value of *U* is as low as possible. We seek radicals that do not dimerize in the solid state, and yet pack tightly so as afford an electronic bandwidth *W* capable of competing with *U*. These heavy atom radicals also show diverse magnetic properties, including magnetic bistability, spin-canted antiferromagnetic and ferromagnetic ordering with large coercive fields.

Awards and Distinctions:

• Honorary Canadian Ramsay Memorial Fellow (1976-78). • NSERC University Research Fellow (1980-87); ACS Akron Section Award (1991); CSC Alcan Lecture Award (1993); Fellow of the Chemical Institute of Canada (1993); CSC Pure or Applied Inorganic Chemistry Award (2001); Canada Council Killam Research Fellow (2006-08); Fellow of the Royal Society of Canada (2009)

Selected Publications:

• C. M. Robertson, A. A. Leitch, K. Cvrkalj, R. W. Reed, D. J. T. Myles, P. A. Dube and R. T. Oakley, **2008**. "Enhanced Conductivity and Magnetic Ordering in Isostructural Heavy Atom Radicals." *J. Am. Chem. Soc*. **130**, 8414-8425. • A. A. Leitch, X. Yu, S. M. Winter, R. A. Secco, P. A. Dube and R. T. Oakley, **2009**. "Structure and Property Correlations in Heavy Atom Radical Conductors." *J. Am. Chem. Soc*. **131**, 7112-7125. • J. S. Tse, A. A. Leitch, X. Yu, X. Bao, S. Zhang, Q. Liu, C. Jin, R. A. Secco, S. Desgreniers, Y. Ohishi and R. T. Oakley, **2010**. "Metallization of a Hypervalent Radical Dimer: Molecular and Band Perspectives." *J. Am. Chem. Soc*. **132**, 4876-4886. • S. M. Winter, S. Datta, S. Hill and R. T. Oakley, **2011**. "Magnetic Anisotropy in a Heavy Atom Radical Ferromagnet." *J. Am. Chem. Soc.* **133**, 8126-8129. • X. Yu, A. Mailman, K. Lekin, A. Assoud, C. M. Robertson, B. C. Noll, C. F. Campana, J. A. K. Howard, P. A. Dube and R. T. Oakley, **2012**. "Semiquinone-bridged Bisdithiazolyl Radicals as Neutral Radical Conductors." *J. Am. Chem. Soc*. **134**, 0000-0000.