THOMAS M. ROSSEEL

National Materials Lead, Light Water Reactor Sustainability Program
Materials Science and Technology (MST) Division, Oak Ridge National Laboratory
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EDUCATION:

Ph.D.: **University of Wisconsin-Madison**: *Investigation of Mixed Oxidation States of Transition Metal Oxides in Insulator Materials Using Synchrotron Radiation and X-ray Photoelectron Spectroscopy, 1981*

B.S. Chem: **University of Michigan-Ann Arbor** (*Highest Honors in Chemistry and with High Distinction*),1975

RESEARCH, PROFESSIONAL, and MANAGERIAL EXPERIENCE:

2019-Present: ***National Lead, Materials Research Path (MRP), Light Water Reactor Sustainability Program.*** In cooperation with MRP Task Leads at four DOE national labs (ORNL, PNNL, ANL, and INL) and university partners (University of Michigan, UCLA, UCSB, and University of Tennessee), develop the short- and long-term objectives and engage stakeholders, including the US NRC, EPRI, industry, and international colleagues to guide the pathway research. The goal is to inform relicensing decisions and aging management by developing the scientific knowledge for understanding, predicting, monitoring, and mitigation of materials (metals, concrete, cables) degradation as a function of their use and the environment in NPPs.

2018–Present: ***Technical Project Manager, Effects of Irradiation on Bond Strength in Concrete Structures, (US NRC).*** The goal of this project is to study the effects of irradiation on bond properties of reinforcing steel and other support anchorage steel with shielding and structural concrete for extended pant operation.

2015-2019: ***Deputy Lead, Materials Research Path (MRP), Light Water Reactor Sustainability Program.*** Assist the Pathway Lead in the management of 20 tasks within the MRP. The goal is to inform relicensing decisions and aging management programs by developing the scientific knowledge basis for understanding and predicting changes to key materials as a function of their use and the environment in NPPs. Specific management responsibilities included managing the Concrete (NDE, ASR, irradiation effects), Zion Harvesting and testing, and Cables (Aging & NDE) tasks.

2014-Present: ***International Committee on Irradiated Concrete (ICIC):*** Led the effort to create a new technical organization to provide a forum for broad technical interactions in research on the effects of irradiation on concrete used in nuclear applications, such as nuclear facilities, storage, and disposal sites, and which will contribute to advancing the current state of knowledge.

2012-2019: ***Task Manager, LWRS, MRP, Irradiated Concrete.*** Managed the development of an irradiated concrete knowledge base for aging management at extended plant operation. Task included evaluating opportunities to harvest and test service irradiated concrete, irradiating prototypical aggregates, cement, and concrete to enhance the understanding of the effects of radiation. These results provide input to establish a tool for modeling radiation damage in the biological shield and structural supports. A critical component included leveraging ICIC member capabilities to improve confidence in the results from the various concretes and research reactors. Collaborations include Japan via DOE / METI CNWG, VTT & Fortum (Finland), CEA & EdF (France), and Czech Technical University in Prague.

2011-2019: ***Task Manager, LWRS, MRP, Zion Harvesting and Testing.*** Coordinated the selective procurement of materials, structures, components, and items of interest to the LWRS Program, ERPI, and NRC from the decommissioned Zion 1 and Zion 2 NPPs. Materials obtained include low-voltage cabling, records (EQ and ISI reports) and through-wall thickness sections of the RPV. The Zion Unit RPV beltline weld and base metal were harvested (Phase 1), cut into blocks (Phase 2), and machined into test specimens (Phase 3). Testing of base and weld metal (Phase 4) is underway. Goal is to validate physical-based embrittlement models to improve codes and standards.

2010-2015: ***Program Manager, MRP, LWRS Program.*** Specific management responsibilities initially included supporting Pathway Lead and Zion Harvesting Project and expanded to include Concrete and Cables.

2009-2011: **Manager, Korean Visiting Scientist Program.** Successfully implemented the Korea Visiting Scientist Program sponsored by the Korean Ministry of Knowledge Economy. The goal was to facilitate international personnel exchanges with cutting-edge advanced materials research at ORNL.

2000-2013: ***Manager, MST Division Work-for-Others Program***. Managed a budget up to $25M / yr., oversaw the preparation and submission of 80-125 proposals / yr., and the implementation, funding, and completion of materials research for commercial, other federal agencies, and foreign sponsors.

1999-2005: ***Deputy Director, ORNL US DOE, Basics Energy Science (BES) Materials and Engineering Physics Program***. Assisted the Program Director with the management of BES research projects.

1997-2007: ***Project Manager, Heavy Section Steel Irradiation Program (US NRC)***. Program focused on providing a thorough, quantitative assessment of the effects of neutron irradiation on the material behavior and, in particular, the fracture toughness properties of typical pressure vessel steels as they relate to light-water reactor pressure vessel integrity.

1995-1997: ***Technical Manager, Laboratory Technology Research (LTR) CRADA Program***. Responsibilities included establishing program objectives, setting funding priorities, developing performance standards (performance and merit reviews) through liaison with sponsor, and ensuring that objectives and deliverables of DOE and industrial partners were met.

1993 -1995: ***Technical Assistant*** to the Associate Laboratory Directors for Physical Sciences and Advanced Materials and the Advanced Neutron Source (ANS).

1981 - Present: **ORNL Research Scientist**: Analytical Chemistry Division (Heavy Ion Induced X-ray Satellite Emission), Metals and Ceramics Division (RPV embrittlement), and Materials Science and Technology Division (Effects of irradiation on reactor cavity concrete and embrittlement of harvested Zion RPV).

HONORS AND AWARDS:

ICIC Early Career Award (ECA) named the Thomas M. Rosseel ECA, **2020**

US DOE, FLC Award for Excellence in Technology Transfer, "Materials for a Low-Cost, Clean Cookstove," **2012**

University of Wisconsin, Wisconsin Alumni Research Foundation (WARF) Fellowship, **1975-1976**

University of Michigan, Moses Gomberg Undergraduate Prize in Chemistry,**1973 and 1974**

PROFESSIONAL MEMBERSHIPS:

American Chemical Society (ACS) (**since 1975**)

American Nuclear Society (ANS) **(since 2011**)

American Vacuum Society (AVS) (**since 1982**)

International Committee on Irradiated Concrete (ICIC) (**since 2014**)

Sigma Xi (since 1980)

PROFESSIONAL ACTIVITIES:

LWR Materials Aging:	Organized and hosted 5 LWR stakeholder (industry & regulators) engagement meetings focused on metals, mitigation, concrete, cables, and LWR Life Beyond 80 (LBE) research. **September - November 2020**.
DOE LWR Degradation Assessment:	Invited to lead DOE participation in and coordinated presentations for US NRC Public meeting to address aging management research at extended operation up to 100 years. **January 2021**
Mentoring / Staff Development	Over the last 5 years, mentored 2 grad student interns, 3 post docs (2 promoted to staff positions), and 6 early career staff members focusing on improved / expanded research skills, proposal development, teamwork, professionalism, and management. **2016-Present**
EPRI Nuclear Power Council	Member of Concrete Technical Advisory Committee (TAC). **2019 - Present**
Founder; Concrete Research Organization:	*International Committee on Irradiated Concrete* (ICIC). **2014**
Chairman:	ICIC, **2014 - 2015**
Past Chairman:	ICIC, **2015 - 2017**
Technical Area Coordinator	ICIC, **2014 - 2016** and **2019-2022**
Officer:	Tennessee Valley Chapter, AVS: Past President; President, Vice President, Treasurer, Awards Chairman, and Scholarship Chairman. **1983 - 1989**
U.S, DOE Detaille:	US DOE, Office of Science, **1996-1997**
Author / co-author:	Over 80 refereed publications and over 125 Technical Reports

SERVICE ACTIVITIES

Sustaining Member, *University of Michigan Natural History Museum***, 2019-Present**

Patron, *Farragut Museum***, 2015 - Present**

Member, *National Wildlife Federation***, 2019 – Present**

Member, *National Park Foundation***, 2019 - Present**

Chairman, Town of Farragut Recycle Committee, **2009 – 2011**

Vice Chairman, Town of Farragut Community Center Committee, **2009 – 2011**

Vice Chairman, Town of Farragut Parks and Recreation 5 Year Strategic Plan, **2007 – 2009**

Alderman, Town of Farragut, North Ward, **2005 - 2009**

Commissioner, Town of Farragut Municipal Planning Commission, **1998 – 2004**

Chairman, *Concerned Citizens of Stonecrest and Powell Acres***, 1996-2014**. Led neighborhood group and worked with developer of the largest commercial property (Turkey Creek) in Tennessee, Town Staff, and electric utility to mitigate the effects of noise, light, and construction activities on the nearby neighborhoods including moving power lines out of the neighborhood and construction of a mile-long, wood stockade fence.

RECENT PUBLICATIONS:

N. Bibhanshu, M. N. Gussev, T. M. Rosseel, *Complexity of deformation mechanism in neutron-irradiated 304L austenitic stainless steel at microstructural scale*, **Materials Characterization** 178,111218 (2021)

C. E. Torrence, A. B. Giorla, Y. Li, E. Tajuelo Rodriguez, J'D. Arregui Mena, T. M. Rosseel and Y. Le Pape, *MOSAIC: An Effective FFT-based Numerical Method to Assess Aging Properties of Concrete*, **Journal of Advanced Concrete Technology** Vol. 19, 149-167, 2021, doi:10.3151/jact.19.149

P. D. Edmonson, C. P. Massey, M. A. Sokolov, T. M. Rosseel, *High-Resolution Characterization of the Through Wall Attenuation Effect in Reactor Pressure Vessel Steel*, ***J. Nuc. Matls***., 545, 152740 (2021); https://doi.org/10.1016/j.jnucmat.2020.152740.

Y. Li, Y. Le Pape, E. Tajuelo Rodriguez, C. E. Torrence, J'D. Arregui Mena, T. M Rosseel, and M. Sircar, *Microstructural characterization and assessment of mechanical properties of concrete based on combined elemental analysis techniques and Fast-Fourier transform-based simulations,* ***J. Con and Build Matls,*** 257, 1195, (2020)

G. E. Jellison, D. N. Leonard, L. M. Anovitz, M. C. Cheshire, E. D. Specht, and T. M. Rosseel, *Crystallographic orientation of orthorhombic aragonite using reflection generalized ellipsometry*, ***J. Appl. Phys****.* 126, 043102 (2019); *https://doi.org/10.1063/1.5109093*

M.N Gussev, G. Meric de Bellefon, and T.M. Rosseel, **ORNL/TM-2019/1274**, Analysis of Localized Deformation Processes in Highly Irradiated Austenitic Stainless Steel Through In-Situ Techniques, 2019

Y. Le Pape, E. Tajuelo-Rodriguez, J. D. Arregui-Mena, A. Giorla, L. Anovitz and T. M. Rosseel, *Neutron-Irradiation-induced damage assessment in concrete using combined phase characterization and nonlinear fast Fourier transform simulation*, **Proc. of 10th International Conference on Fracture Mechanics of Concrete and Concrete Structures *FraMCoS-X*,** G. Pijaudier-Cabot, P. Grassl and C. La Borderie (Eds), June 2019

E. Tajuelo Rodriguez, Y. Le Pape, T. M. Rosseel, W. A. Hunnicutt, Effect of gamma irradiation on creep properties of cement paste analogues, **Proc of. 19th International Conference on Environmental Degradation of Materials in Nuclear Power Systems, ANS Trans**, Boston, August 18-22, 2019. July 2019

Vaitova, M., Stemberk, P., Rosseel, T. M., Fuzzy Logic Model of Irradiated Aggregates, **NEURAL NETWORK WORLD** 29(1):1-18 · January 2019, *DOI: 10.14311/NNW.2019.29.001*

Jellison, Jr., G. E., Leonard, D. N., Anovitz, L. M., Parish, C. M., Specht, E. D., and Rosseel, T. M., *Crystallographic orientation of uniaxial calcite and dolomite determined using reflection generalized ellipsometry*, ***J. Appl. Phys***. 124, 223102 (2018)

Silva, C., Rosseel, T. M., & Kirkegaard, M. C., *Radiation-Induced Changes in Quartz, A Mineral Analog of Nuclear Power Plant Concrete Aggregates,* ***Inorg. Chem****., 2018, DOI: 10.1021/acs.inorgchem.8b00096*

Remec, I., Rosseel, T.M., Field, K.G. and Le Pape, Y. *Radiation-Induced Degradation of Concrete in NPPs, Reactor Dosimetry*: **Proc. 16th International Symposium, 2018**, ***ASTM STP1608***, 201-211

Rosseel, T.M., Sokolov, M., Chen, X., Nanstad, R.K., *Current Status of the Characterization of RPV Materials Harvested from the Decommissioned Zion Unit 1 Nuclear Power Plant*, PVP2017-65090, **Proceedings of the ASME 2017 Pressure Vessels & Piping Conference, PVP2017, Volume 1B: Codes & Standards,** ISBN: 978-0-7918-5791-5 doi:10.1115/PVP2017-65090.

Rosseel, T. M., Gussev, M. N., Mora, L. F., *The Effects of Neutron Irradiation on the Mechanical Properties of Mineral Analogues of Concrete Aggregates*, **Proceedings of the 18th International Conference on Environmental Degradation of Materials in Nuclear Power Systems – Water Reactors**, *Vol..2* , J. H. Jackson et al., The Minerals, Metals & Materials Series, pp. 151-161 (2017) *c*

Rosseel, T.M., Maruyama, I., Le Pape, Y., Kontani O., Giorla, A., Remec, I., Wall, J.J.; Sircar, M.; Andrade, C. & Ordonez, M., *Review of the Current State of Knowledge on the Effects of Irradiation on Concrete*, **Journal of Advanced Concrete Technology***, 14 (2016), 368-383. (**Invited**)*

Remec, I.; Rosseel, T.; Field, K. & Le Pape, Y. Characterization of Radiation Fields for Assessing Concrete Degradation in Biological Shields of NPPs, **Proc. of 9th Topical Meeting of the Radiation Protection and Shielding Division of the American Nuclear Society - (RPSD-2016)**, January 2016

Rosseel, T.M., Field, K.G., Le Pape, Y., Remec, I., Giorla, A.B. and Wall, J.J., (2015). "Recent Advances in Understanding Radiation Damage in Reactor Cavity Concrete," **Proceedings: international symposium on structural mechanics in reactor technology, SMiRT 23***,* Manchester, UK, September 2015. Paper 647.

T. M. Rosseel, K.G. Field, Y. Le Pape, I. Remec, A. B. Giorla, and J. J. Wall, Dommages d'irradiation dans les cavites en beton des reacteurs aus Etats-Unis, **Le Revue Generale Nucleaire**, Jan-Feb 2015, No.1, 21-27