

JOHN RUSSELL AMBROSE, Ph.D., P.E.

EDUCATION AND CAREER DEVELOPMENT

- Bachelor of Science with Special Attainments in Chemistry, Washington and Lee University, Lexington, Virginia, 1961.
- Doctor of Philosophy, University of Maryland, College Park, Maryland, 1972. Thesis title: "Tribo-Ellipsometry: A New Technique to Study the Relationship of Repassivation Kinetics to Stress Corrosion".
- Registered Professional Engineer, PE 0027562, Florida.
- Participated in the National Council of Engineering Examiners [NCEE] program for establishing criteria and guidelines to be used in the preparation of professional engineering registration qualifying examinations.
- Examination scorer for all NCEE Metallurgical Professional Engineering examinations [1983-90].

PROFESSIONAL ASSOCIATIONS

- The National Association of Corrosion Engineers [past Chairman, Southeast Region]
- ASM International - The Materials Information Society.

CAREER HISTORY

Forcon International Corporation - Consultant - providing expertise on issues related to Materials Science and Engineering.

University of Florida, Gainesville, Florida - Associate Professor, Department of Materials Science and Engineering.

- Materials Science and Engineering, Introductory Course, EMA 3010, 1978/2006 - service course for the college of engineering: established relationships between atomic/molecular structure and performance of materials in mechanical service; effects of processing on structure of all engineering materials.
- Stability of Materials, EMA 4324, 1985/7 [team], 1998/2006 - senior level departmental core course: developed relationships between material degradation kinetics and experimental methods for prediction of performance; design and interpretation of results from experimental testing protocols; analysis of environmental service failures of engineering materials.
- Materials Selection and Failure Analysis, EMA 4714, 1996/2006 - senior level capstone design course: development of non-subjective criteria for selection of materials for mechanical, electrical and thermal service; optimization of selection based on an integration of component function with material property limits/constraints to create a performance or merit index - economics, reliability, risk/benefit analysis and statistical design of experiments are objectives to be considered in the process of selection. Selected case studies based on my consulting activities are used to illustrate the process by which failures are systematically analyzed and to introduce student engineers to the elements involved in product liability law.

- Integrated Product and Process Design, EMA 4915/16, 1997/2006: senior level design course which is substituted for departmental senior research; involves multidisciplinary student engineering teams working on problems submitted and scoped by regional businesses - elements of commercialization, identification of customer need, conceptualization of engineering solutions, design, construction and testing of actual prototypes are all included in the program. Among the companies furnishing projects for the teams I have coached are: Medtronics Xomed, Siemens Westinghouse, Lockheed Martin, Harris Corporation and Regeneration Technologies.

National Bureau of Standards, NBS [now National Institute for Science and Technology, NIST], Washington, DC. - Research Scientist, Corrosion and Electrodeposition Section.

- Committee G01.11 on Electrochemical Measurements in Corrosion Testing; chaired task group involved with development of standards for corrosion in nuclear power systems.
- Consultant for the Consumer Products Safety Commission.
- Development of multifunctional analytical procedures for characterizing more than a single variable controlling the rate of a localized corrosion reaction - allowed determination of the rates for the critical path or step of an overall process.
- Development of accelerated test procedures for predicting susceptibility of materials to corrosion attack.

Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia - Research Chemist.

- Development of procedures for new analytical technologies in materials characterization and conformation to compositional specifications for substances used aboard naval vessels.
- Qualification of US Navy, Bettis [Westinghouse] technical staff and shipyard personnel with respect to analytical chemistry procedures.

Princess Anne High School, Virginia Beach City School Board, Virginia Beach, Virginia Faculty member.

- Chemistry teacher
- Design of chemistry laboratory experience for students in college preparatory curriculum.

AREAS OF TECHNICAL EXPERTISE

- Over 325 cases during the last 10 years dealing with product casualty and loss issues, both subrogation and product liability litigation involvement [deposition/trial testimony history during the past 5 years listed separately].
- Experienced in incident reconstruction analysis - integration of failure mode [fractographic analysis] with service conditions to understand the process by which the failure was caused and to establish the causal relationship between detection of a defect and the occurrence of a loss resulting from the use of a product.
- Application and interpretation of experimental results from a number of surface characterization instrumental analysis including: Scanning Electron Microscopy [SEM], Energy Dispersive X-ray

Spectroscopy [EDX/EDS], X-ray Photoelectron Spectroscopy [XPS/ESCA], Electron Microprobe Chemical Analysis [EPMA].

- Use and interpretation of results from a number of chemical, photochemical and electrochemical analysis techniques including: Fourier Transform Infrared Spectroscopy [FTIR], Inductively Coupled Plasma Spectroscopy [ICPS], Atomic Absorption Spectroscopy [AAS], Gas and Liquid Chromatography and conventional wet chemistry analysis.
- Optical Microscopic Characterization of material macro- and microstructures - sample/specimen preparation, metallographic polishing procedures and etchant selection for phase and microconstituent analysis.
- Application of materials selection criteria for corrosion prevention or control in systems design - includes incorporation of relevant building/construction codes and applicable ANSI, SAE and ASTM standards and specifications.
- Access to the Major Analytical Instrumentation Center [MAIC], Department of Materials Science and Engineering University of Florida.
- Established professional relationships with a number of recognized ISO 9001 private testing facilities.

EXAMPLES OF FORENSIC INVESTIGATION AND FAILURE ANALYSES PERFORMED

- Coil and boiler tube failures in ammonia absorption refrigeration systems.
- Corrosion, stress corrosion and environmental stress cracking failures in metallic [aluminum, copper, black iron and galvanized steel] and polymeric [PVC, CPVC, PP, HDPE] water distribution systems - HVAC cooling, irrigation and potable water supplies.
- Toilet tanks and components [float valves and coupling devices] - mechanical and environmental stress cracking [ESC] failures.
- Explosions in secondary [storage] vehicle batteries.
- Mechanical and corrosion related failures in metallic and polymeric orthopedic surgical implants - prostheses and fixation devices.
- Corrosion failures in fire sprinkler systems, both CPVC [chlorinated polyvinylchloride] and black iron - water release elements [sprinkler heads] and associated valves and coupling devices.
- Determination of electrical fire causation/origin based on microstructural characterization of electrical cables and wiring.
- Failures resulting in personal injury from use and abuse of ladders - A-frame and extension types.
- Failures in chairs, residential and workplace, including wheelchairs - suspension frames and wheel axle components.
- Failures in ceramic materials - conventional clay based and silica based [coated and uncoated window glasses].
- Fiber reinforced composite mechanical failures - manufacturing and service related defects.
- Mechanical and corrosion related failures in pressure vessels and pipelines including steam generation equipment [boilers, nuclear reactors] and heat exchangers.
- Patent infringement of weld overlay procedures for manufacture of corrosion resistant boiler tubes.
- Failures in mechanical fasteners [bolts, screws] and lifting equipment [wire rope and attachments].

- Failures of heat- and solvent-welded joints, including soldered and brazed connections.
- Fatigue failures in shafts, axles and other moving parts.

AWARDS AND HONORS

- The Melvin Romanoff Award, Northeast Region, NACE, 1972.
- Sustained Superior Performance, National Bureau of Standards, 1978.
- **Who's Who**, American Men and Women in Science.
- "Teacher of the Year", Departmental and College Awards, 1989-90.
- Summer Faculty Fellowship recipient, NASA-KSC, summers of 1991-2.

SELECTED PUBLICATIONS AND SPEAKING ENGAGEMENTS

- "Will the Integration of Materials Science into Engineering Core Undergraduate Curricula Ever be Complete - Is the Chemistry Right?", MRS Bulletin, **17**, 32 [1992].
- "Beneficial Aspects of the Environmental Stability of Materials", MRS Bulletin, **18**, 53 [1993].
- "Characterization of Fire Temperatures by Microstructural Analysis of Various Metals and Ceramics", invited talk presented to the Florida Advisory Committee on Arson Prevention.