

Tedd E. Lister

Materials Properties and Performance
Idaho National Laboratory
P.O. Box 1625
Idaho Falls, ID 83415-2218
(208) 526-4320
Tedd.Lister@inl.gov

Current Projects

- **Mediated electrochemical synthesis of energetic materials**

The synthesis of 2,2-dinitropropanol from nitroethane has been achieved using ferro/ferricyanide as a mediator to perform oxidative nitration of nitroethane. This is a collaboration between INL researchers Bob Fox and myself with ATK Launch Systems. This project is moving to pilot plant scale synthesis to be performed at the ATK Utah facility. The process has demonstrated lower waste and better utilization of chemicals.

- **Microelectrodeposition for preparation of mass spectrometry samples**

This work is collaboration with the mass spectrometry group. Deposition of small amounts of material not only reduces sample requirements but also improves sample transfer through the ion optics of a mass spectrometer. This work has wide ranging applications in non-proliferation and geological dating.

- **Corrosion studies of materials used in spent nuclear fuel storage**

Specific work on neutron absorbing alloys such as [Ni-Cr-Mo-Gd alloy developed](#) at the INL. Corrosion studies for these neutron absorbing alloys have considered environments possible inside failed waste containers for long-term storage applications. This work is important to validate the safety case for long-term waste storage.

Research Interests

- **Electrodeposition**

- Micro-electrodeposition preparation for isotopic analysis
- Site specific electrodeposition of new materials
- Use as a method of selective chemical removal or detection in natural waters

- **Electrosynthesis**

- Energetic materials synthesis for “green” synthesis

- **Surface probes for analysis and manipulation of surfaces**

- Scanning electrochemical microscopy to measure or perform surface reaction under solution
- Scanning probe microscopy of surfaces to determine topology or specific physical properties

- **Electrochemistry to meet future energy needs**
 - Reactivity of surfaces to improve conversion issues
 - Materials to improve storage of energy
- **Corrosion**
 - Long-term stability of man-made materials and how to predict the lifetime of materials using small time periods
 - Relating corrosion testing standards to actual service conditions
 - Understanding mechanisms of localized corrosion

Education

- B.S. Chemistry, University of North Carolina Wilmington, 1991
- Ph.D. Analytical Chemistry, University of Georgia Athens, 1996
- Postdoctoral Fellowship, Utah State University, 1996-97
- Postdoctoral Fellowship, Argonne National Laboratory, 1997-2000

Patents

Patents

- Tedd E. Lister and Robert V. Fox, *Methods for Performing Electrochemical Nitration Reactions*, Patent Pending, Submitted 08/09/07.
- Ronald E. Mizia, Richard N. Wright, William D. Swank, Tedd E. Lister, Patrick J. Pinhero, *Materials Modifications to Composite Neutron Absorbing Coatings*, Patent Pending, Submitted 12/17/05.
- Ronald E. Mizia, Richard N. Wright, William D. Swank, Tedd E. Lister, Patrick J. Pinhero, *Neutron Absorbing Coating for Criticality Control*, Patent 7,286,626.

Selected Publications

Publications

- T.E. Lister and R.V. Fox, *Electrochemical Synthesis of 2,2-dinitropropanol*, Journal of Applied Electrochemistry (Accepted).
- R.E. Mizia, T.E. Lister, P.J. Pinhero, T.L. Trowbridge, W.L. Hurt, C.V. Robino, J.J. Stephens, and J.N. DuPont, *Development and Testing of an Advanced Neutron-Absorbing Gadolinium Alloy for Spent Nuclear Fuel Storage*, Nuclear Technology 155, 133 (2006).
- T.E. Lister, R.E. Mizia, P.J. Pinhero, T.L. Trowbridge, and K. Delezene Briggs, *Corrosion Properties of NiCrMoGd Structural Neutron Absorbing Alloy*, Corrosion **61**, 706 (2005).

- T.E. Lister, P.J. Pinhero, T.L. Trowbridge, and R.E. Mizia, and, *Localized Attack of a Two-Phase Metal, Scanning Electrochemical Microscopy Studies of NiCrMoGd Alloys*, *Journal of Electroanalytical Chemistry* **579**, 291 (2005).
- T.E. Lister and P.J. Pinhero, *Microelectrode Array Microscopy: Investigation of Dynamic Corrosion Behavior of Localized Corrosion at Type 304 Stainless Steel Surfaces*, *Analytical Chemistry* **77**, 2601 (2005).
- C.J. Boxley, H.S. White, T.E. Lister, P.J. Pinhero, *Electrochemical Deposition and Reoxidation of Au at Highly Oriented Pyrolytic Graphite. Stabilization of Au Nanoparticles on the Upper Plane of Step Edges*, *Journal of Physical Chemistry B* **107**, 451-458 (2003).
- T.E. Lister, RN Wright, PJ Pinhero, WD Swank, *Corrosion of Thermal Spray Hastelloy C-22 Coatings in Dilute HCl*, *Journal of Thermal Spray Technology* **11**, 530 (2002).
- T.E. Lister and P.J. Pinhero, *Scanning Electrochemical Microscopy of Corrosion Dynamics on Type 304 Stainless Steel*, *Electrochemistry and Solid State Letters* **5**, B33 (2002).
- T.E. Lister and P. J. Pinhero, *In-vivo Atomic Force Microscopy of Surface Proteins within Deinococcus Radiodurans*, *Langmuir* **17**, 2624 (2001).
- T.E. Lister, Y. Chu, H. You, J. Mitchell, R. Yonco, and Z. Nagy, *Cathodic Activation RuO₂ Single Crystal Surfaces for Hydrogen Evolution Reaction*, *Journal of Electroanalytical Chemistry* 554-555, 71 (2003).
- T.E. Lister, Y. Chu, W. Cullen, H. You, R.M. Yonco, J.F. Mitchell, and Z. Nagy, *Electrochemical and X-ray Scattering Study of Well Defined RuO₂ Single Crystal Surfaces*, *Journal of Electroanalytical Chemistry*, **524-525**, 201 (2002).
- Y.S. Chu, H. You, T.E. Lister, J. Mitchell, R. Yonco, and Z. Nagy, *Commensurate Water Monolayer on Rutile RuO₂(110): A Surface X-ray Scattering Study With Electrochemical Reduction/Oxidation*, *Physical Review Letters* **86**, 3364 (2001).
- Y.S. Chu, H. You, J.A. Tanzer, T.E. Lister, and Z. Nagy, *Surface Resonance X-Ray Scattering: Core-Electron Binding-Energy Shifts of Pt(111) Surface Atoms during Electrochemical Oxidation*, *Physical Review Letters* **83**, 552 (1999).
- M.C. Granger, J. Xu, T.E. Lister, and G.M. Swain, *The Use of Conductive and Semiconductive Diamond Thin Films in Electrochemistry*, invited A-page article for *Analytical Chemistry*. **69**, 591A (1997).

- T.E. Lister and J.L. Stickney, *Atomic Level Studies of Se Electrodeposition on Au(111) and Au(110) Surfaces*, Journal of Physical Chemistry, **100**, 19576, (1996).