



## Robert Huggins

Professor of Materials Science and Engineering, Emeritus

### CONTACT INFORMATION

- **Alternate Contact**

**Email** rhuggins@stanford.edu

**Tel** 650-843-0613 or 650-521-1438

### Bio

---

#### BIO

Professor Huggins joined Stanford as Assistant Professor in 1954, was promoted to Associate Professor in 1958, and to Professor in 1962.

His research activities have included studies of imperfections in crystals, solid-state reaction kinetics, ferromagnetism, mechanical behavior of solids, crystal growth, and a wide variety of topics in physical metallurgy, ceramics, solid state chemistry and electrochemistry. Primary attention has recently been focused on the development of understanding of solid state ionic phenomena involving solid electrolytes and mixed ionic-electronic conducting materials containing atomic or ionic species such as lithium, sodium or oxygen with unusually high mobility, as well as their use in novel battery and fuel cell systems, electrochromic optical devices, sensors, and in enhanced heterogeneous catalysis. He was also involved in the development of the understanding of the key role played by the phase composition and oxygen stoichiometry in determining the properties of high temperature oxide superconductors.

Topics of particular recent interest have been related to energy conversion and storage, including hydrogen transport and hydride formation in metals, alloys and intermetallic compounds, and various aspects of materials and phenomena related to advanced lithium batteries.

He has over 400 professional publications, including three books; "Advanced Batteries", published by Springer in 2009, "Energy Storage", published by Springer in 2010, and Energy Storage, Second Edition in 2016.

#### ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Materials Science and Engineering
- Affiliate, Precourt Institute for Energy

#### ADMINISTRATIVE APPOINTMENTS

- Director, Center for Materials Research, Stanford, (1961-1977)
- Director for Materials Sciences, Advanced Research Projects Agency (ARPA), (1968-1970)
- Chief Scientist, Center for Solar Energy and Hydrogen Research, Ulm, Germany, (1991-1995)
- Honorary Professor, University of Ulm, Germany, (1994- present)
- Honorary Professor, University of Kiel, Germany, (2000- present)

## HONORS AND AWARDS

- Hardy Gold Medal, AIME (1957)
- Senior Postdoctoral Fellowship, National Science Foundation (1965-1966)
- Senior United States Scientist Award, Alexander von Humboldt Foundation (1977)
- 23rd Annual Vincent Bendix Award, American Society for Engineering Education (1978)
- Research Award, Electrochemical Society's Battery Division (1982)
- Research Award, International Battery Association (2001)

## PROFESSIONAL EDUCATION

- BA, Amherst College , Physics (1950)
- ScD, MIT , Metallurgy (1954)

## Publications

---

### PUBLICATIONS

- **Energy Storage, Second Edition**  
Huggins, R. A.  
Springer.2016
- **Full open-framework batteries for stationary energy storage.** *Nature communications*  
Pasta, M., Wessells, C. D., Liu, N., Nelson, J., McDowell, M. T., Huggins, R. A., Toney, M. F., Cui, Y.  
2014; 5: 3007-?
- **Full open-framework batteries for stationary energy storage.** *Nature communications*  
Pasta, M., Wessells, C. D., Liu, N., Nelson, J., McDowell, M. T., Huggins, R. A., Toney, M. F., Cui, Y.  
2014; 5: 3007-?
- **Highly reversible open framework nanoscale electrodes for divalent ion batteries.** *Nano letters*  
Wang, R. Y., Wessells, C. D., Huggins, R. A., Cui, Y.  
2013; 13 (11): 5748-5752
- **Oxidation processes on conducting carbon additives for lithium-ion batteries** *JOURNAL OF APPLIED ELECTROCHEMISTRY*  
La Mantia, F., Huggins, R. A., Cui, Y.  
2013; 43 (1): 1-7
- **The Ferrocyanide/Stabilized Carbon System, a New Class of High Rate, Long Cycle Life, Aqueous Electrolyte Batteries** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Huggins, R. A.  
2013; 160 (5): A3020-A3025
- **Do You Really Want an Unsafe Battery?** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Huggins, R. A.  
2013; 160 (5): A3001-A3005
- **Cotton-templated hierarchical porous structures for high power lithium rechargeable batteries** *JOURNAL OF MATERIALS CHEMISTRY A*  
Choi, D. I., Lee, H., Lee, D. J., Nam, K., Kim, J., Huggins, R. A., Park, J., Choi, J. W.  
2013; 1 (17): 5320-5325
- **A high-rate and long cycle life aqueous electrolyte battery for grid-scale energy storage** *NATURE COMMUNICATIONS*  
Pasta, M., Wessells, C. D., Huggins, R. A., Cui, Y.  
2012; 3
- **Tunable Reaction Potentials in Open Framework Nanoparticle Battery Electrodes for Grid-Scale Energy Storage** *ACS NANO*  
Wessells, C. D., McDowell, M. T., Peddada, S. V., Pasta, M., Huggins, R. A., Cui, Y.

2012; 6 (2): 1688-1694

- **The Effect of Insertion Species on Nanostructured Open Framework Hexacyanoferrate Battery Electrodes** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Wessells, C. D., Peddada, S. V., McDowell, M. T., Huggins, R. A., Cui, Y.  
2012; 159 (2): A98-A103
- **Nickel Hexacyanoferrate Nanoparticle Electrodes For Aqueous Sodium and Potassium Ion Batteries** *NANO LETTERS*  
Wessells, C. D., Peddada, S. V., Huggins, R. A., Cui, Y.  
2011; 11 (12): 5421-5425
- **Copper hexacyanoferrate battery electrodes with long cycle life and high power** *NATURE COMMUNICATIONS*  
Wessells, C. D., Huggins, R. A., Cui, Y.  
2011; 2
- **Electrochemical characterization of LiCoO<sub>2</sub> as rechargeable electrode in aqueous LiNO<sub>3</sub> electrolyte** *17th International Conference on Solid State Ionics*  
Ruffo, R., La Mantia, F., Wessells, C., Huggins, R. A., Cui, Y.  
ELSEVIER SCIENCE BV.2011: 289-92
- **Recent results on aqueous electrolyte cells** *JOURNAL OF POWER SOURCES*  
Wessells, C., Huggins, R. A., Cui, Y.  
2011; 196 (5): 2884-2888
- **Synthesis of Nanoscale Lithium-Ion Battery Cathode Materials Using a Porous Polymer Precursor Method** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Deshazer, H. D., La Mantia, F., Wessells, C., Huggins, R. A., Cui, Y.  
2011; 158 (10): A1079-A1082
- **Synthesis and Electrochemical Performance of a Lithium Titanium Phosphate Anode for Aqueous Lithium-Ion Batteries** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Wessells, C., La Mantia, F., Deshazer, H., Huggins, R. A., Cui, Y.  
2011; 158 (3): A352-A355
- **Investigations of the Electrochemical Stability of Aqueous Electrolytes for Lithium Battery Applications** *ELECTROCHEMICAL AND SOLID STATE LETTERS*  
Wessells, C., Ruffo, R., Huggins, R. A., Cui, Y.  
2010; 13 (5): A59-A61
- **Impedance Analysis of Silicon Nanowire Lithium Ion Battery Anodes** *JOURNAL OF PHYSICAL CHEMISTRY C*  
Ruffo, R., Hong, S. S., Chan, C. K., Huggins, R. A., Cui, Y.  
2009; 113 (26): 11390-11398
- **Structural and electrochemical study of the reaction of lithium with silicon nanowires** *14th International Meeting on Lithium Batteries*  
Chan, C. K., Ruffo, R., Hong, S. S., Huggins, R. A., Cui, Y.  
ELSEVIER SCIENCE BV.2009: 34-39
- **Electrochemical behavior of LiCoO<sub>2</sub> as aqueous lithium-ion battery electrodes** *ELECTROCHEMISTRY COMMUNICATIONS*  
Ruffo, R., Wessells, C., Huggins, R. A., Cui, Y.  
2009; 11 (2): 247-249
- **Spinel LiMn<sub>2</sub>O<sub>4</sub> Nanorods as Lithium Ion Battery Cathodes** *NANO LETTERS*  
Kim, D. K., Muralidharan, P., Lee, H., Ruffo, R., Yang, Y., Chan, C. K., Peng, H., Huggins, R. A., Cui, Y.  
2008; 8 (11): 3948-3952
- **High-performance lithium battery anodes using silicon nanowires** *NATURE NANOTECHNOLOGY*  
Chan, C. K., Peng, H., Liu, G., Mcilwrath, K., Zhang, X. F., Huggins, R. A., Cui, Y.  
2008; 3 (1): 31-35
- **Nanowire Batteries for Next Generation Electronics** *IEEE International Electron Devices Meeting*  
Chan, C. K., Connor, S. T., Yang, Y., Hsu, C., Huggins, R. A., Cui, Y.  
IEEE.2008: 175-178

- **Reaction of lithium with FeAsS, a quaternary system** *IONICS*  
McLaurin, R. A., Huggins, R. A.  
2007; 13 (3): 107-110
- **Cause of the memory effect in "nickel" electrodes** *Joint Meeting of the International-Battery-Association/Hawaii Battery Conference (IBA-HBC 2006)*  
Huggins, R. A.  
ELSEVIER SCIENCE BV.2007: 640-45
- **Mechanism of the memory effect in "Nickel" electrodes** *15th International Conference on Solid State Ionics*  
Huggins, R. A.  
ELSEVIER SCIENCE BV.2006: 2643-46
- **Use of simple ac technique to determine the ionic and electronic conductivities in pure and Fe-substituted SrSnO<sub>3</sub> perovskites** *JOURNAL OF POWER SOURCES*  
Thangadurai, V., Huggins, R. A., Weppner, W.  
2002; 108 (1-2): 64-69
- **Determination of the electronic and ionic partial conductivities in several mixed conductors using a simple AC method** *4th International Symposium on Ionic and Mixed Conducting Ceramics*  
Thangadurai, V., Huggins, R. A., Weppner, W.  
ELECTROCHEMICAL SOCIETY INC.2002: 109-28
- **Mixed ionic-electronic conductivity in phases in the praseodymium oxide system** *JOURNAL OF SOLID STATE ELECTROCHEMISTRY*  
Thangadurai, V., Huggins, R. A., Weppner, W.  
2001; 5 (7-8): 531-537
- **Investigations of a Number of Alternative Negative Electrode Materials for Use in Lithium Cells** *IONICS*  
Netz, A., Huggins, R. A., Weppner, W.  
2001; 7 (4-6): 433-439
- **Decrepitation Model For Capacity Loss During Cycling of Alloys in Rechargeable Electrochemical Systems** *IONICS*  
Huggins, R. A., Nix, W. D.  
2000; 6 (1-2): 57-63
- **Investigations of Praseodymium Oxide Electrodes in Lithium Concentration Cells** *IONICS*  
Netz, A., Chu, W. F., Thangadurai, V., Huggins, R. A., Weppner, W.  
1999; 5 (5-6): 426-433
- **ELECTROCHEMICAL STUDIES OF KINETIC-PROPERTIES OF TITANIUM-HYDROGEN AND VANADIUM-HYDROGEN SYSTEMS AT INTERMEDIATE TEMPERATURES USING MOLTEN-SALT TECHNIQUES** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Liaw, B. Y., DEUBLEIN, G., Huggins, R. A.  
1995; 142 (7): 2196-2203
- **AN ISOPERIBOLIC CALORIMETER TO STUDY ELECTROCHEMICAL INSERTION OF DEUTERIUM INTO PALLADIUM** *FUSION TECHNOLOGY*  
Gur, T. M., Schreiber, M., Lucier, G., FERRANTE, J. A., Chao, J., Huggins, R. A.  
1994; 25 (4): 487-501
- **PARTIAL OXIDATION OF METHANE CATALYZED BY YBA<sub>2</sub>CU<sub>3</sub>OX IN A SOLID-STATE ELECTROCHEMICAL REACTOR** *CATALYSIS LETTERS*  
Gur, T. M., Wise, H., Huggins, R. A.  
1994; 23 (3-4): 387-393
- **HIGH-TEMPERATURE OXYGEN-TRANSPORT AND ELECTROCHEMICAL-BEHAVIOR OF YBA<sub>2</sub>CU<sub>3</sub>OX** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Gur, T. M., Huggins, R. A.  
1993; 140 (7): 1990-2000
- **INVESTIGATION OF SOLID SODIUM REFERENCE ELECTRODES FOR SOLID-STATE ELECTROCHEMICAL GAS SENSORS** *APPLIED PHYSICS A-MATERIALS SCIENCE & PROCESSING*  
SCHETTLER, H., Liu, J., Weppner, W., Huggins, R. A.

1993; 57 (1): 31-35

- **A NEW CLASS OF OXYGEN SELECTIVE CHEMICALLY DRIVEN NONPOROUS CERAMIC MEMBRANES .1. A-SITE DOPED PEROVSKITES** *JOURNAL OF MEMBRANE SCIENCE*  
Gur, T. M., Belzner, A., Huggins, R. A.  
1992; 75 (1-2): 151-162
- **INVESTIGATION OF THERMODYNAMIC PROPERTIES OF THE TI-H SYSTEM USING MOLTEN-SALT ELECTROLYTES CONTAINING HYDRIDE IONS** *JOURNAL OF ALLOYS AND COMPOUNDS*  
Liaw, B. Y., DEUBLEIN, G., Huggins, R. A.  
1992; 189 (2): 175-186
- **OXYGEN CHEMICAL DIFFUSION IN STRONTIUM DOPED LANTHANUM MANGANITES** *SOLID STATE IONICS*  
Belzner, A., Gur, T. M., Huggins, R. A.  
1992; 57 (3-4): 327-337
- **MULTINARY ALLOY ELECTRODES FOR SOLID-STATE BATTERIES .2. A NEW LI-SI-MG ALLOY NEGATIVE ELECTRODE MATERIAL FOR USE IN HIGH-ENERGY DENSITY RECHARGEABLE LITHIUM CELLS** *JOURNAL OF POWER SOURCES*  
Anani, A., Huggins, R. A.  
1992; 38 (3): 363-372
- **MULTINARY ALLOY ELECTRODES FOR SOLID-STATE BATTERIES .1. A PHASE-DIAGRAM APPROACH FOR THE SELECTION AND STORAGE PROPERTIES DETERMINATION OF CANDIDATE ELECTRODE MATERIALS** *JOURNAL OF POWER SOURCES*  
Anani, A., Huggins, R. A.  
1992; 38 (3): 351-362
- **PHASE-BEHAVIOR AND CONDUCTIVITY OF LI<sub>2</sub>SiS<sub>3</sub> COMPOSITION** *SOLID STATE IONICS*  
Ahn, B. T., Huggins, R. A.  
1991; 46 (3-4): 237-242
- **ELECTROCATALYTIC CONVERSION OF CARBON-DIOXIDE TO METHANE AND OXYGEN WITH AN OXYGEN ION-CONDUCTING ELECTROLYTE** *JOURNAL OF CATALYSIS*  
Gur, T. M., Wise, H., Huggins, R. A.  
1991; 129 (1): 216-224
- **THERMODYNAMIC AND STRUCTURAL CONSIDERATIONS OF INSERTION REACTIONS IN LITHIUM VANADIUM BRONZE STRUCTURES** *SOLID STATE IONICS*  
Liaw, B. Y., Raistrick, I. D., Huggins, R. A.  
1991; 45 (3-4): 323-328
- **INTERMEDIATE TEMPERATURE WATER-VAPOR ELECTROLYSIS** *INTERNATIONAL JOURNAL OF HYDROGEN ENERGY*  
Schreiber, M., Lucier, G., FERRANTE, J. A., Huggins, R. A.  
1991; 16 (6): 373-378
- **MATERIALS CONSIDERATIONS RELATED TO SODIUM-BASED RECHARGEABLE CELLS FOR USE ABOVE ROOM-TEMPERATURE** *SOLID STATE IONICS*  
CROUCHBAKER, S., DEUBLEIN, G., Tsai, H. C., Huggins, R. A.  
1990; 42 (1-2): 109-115
- **MEASUREMENT OF THE CHEMICAL DIFFUSION-COEFFICIENT OF OXYGEN IN MIXED CONDUCTORS BY A SOLID-STATE ELECTROCHEMICAL METHOD** *7TH INTERNATIONAL CONF ON SOLID STATE IONICS*  
Belzner, A., Gur, T. M., Huggins, R. A.  
ELSEVIER SCIENCE BV.1990: 535-538
- **RECENT RESULTS ON MIXED CONDUCTORS CONTAINING HYDROGEN OR DEUTERIUM** *7TH INTERNATIONAL CONF ON SOLID STATE IONICS*  
Belzner, A., BISCHLER, U., CROUCHBAKER, S., Gur, T. M., Lucier, G., Schreiber, M., Huggins, R. A.  
ELSEVIER SCIENCE BV.1990: 519-524
- **2 FAST MIXED-CONDUCTOR SYSTEMS - DEUTERIUM AND HYDROGEN IN PALLADIUM - THERMAL MEASUREMENTS AND EXPERIMENTAL CONSIDERATIONS** *WORKSHOP ON COLD FUSION PHENOMENA*  
Belzner, A., BISCHLER, U., CROUCHBAKER, S., Gur, T. M., Lucier, G., Schreiber, M., Huggins, R. A.

PLENUM PUBL CORP.1990: 219-27

- **QUATERNARY PHASE-RELATIONS NEAR  $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$  AT 850-DEGREES-C IN REDUCED OXYGEN PRESSURES** *PHYSICA C-SUPERCONDUCTIVITY AND ITS APPLICATIONS*  
Ahn, B. T., Lee, V. Y., Beyers, R., Gur, T. M., Huggins, R. A.  
1990; 167 (5-6): 529-537
- **PREPARATION, STRUCTURES AND CONDUCTIVITIES OF  $\text{Li}_2\text{Sis}_3$  PHASES** *MATERIALS RESEARCH BULLETIN*  
Ahn, B. T., Huggins, R. A.  
1990; 25 (3): 381-389
- **HIGH-TEMPERATURE PHASE-EQUILIBRIA NEAR  $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$**  *INTERNATIONAL CONF ON MATERIALS AND MECHANISMS OF SUPERCONDUCTIVITY : HIGH TEMPERATURE SUPERCONDUCTORS 2*  
Ahn, B. T., Lee, V. Y., Beyers, R., Gur, T. M., Huggins, R. A.  
ELSEVIER SCIENCE BV.1989: 883-884
- **OXYGEN ORDERING IN  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$**  *INTERNATIONAL CONF ON MATERIALS AND MECHANISMS OF SUPERCONDUCTIVITY : HIGH TEMPERATURE SUPERCONDUCTORS 2*  
Beyers, R., Ahn, B. T., Gorman, G., Lee, V. Y., Parkin, S. S., Ramirez, M. L., Roche, K. P., Vazquez, J. E., Gur, T. M., Huggins, R. A.  
ELSEVIER SCIENCE BV.1989: 548-549
- **THERMODYNAMIC RATIONALIZATION OF MOLTEN-SALT ELECTRODEPOSITION IN OXIDE-BASED SYSTEMS** *JOURNAL OF MATERIALS RESEARCH*  
CROUCHBAKER, S., Huggins, R. A.  
1989; 4 (6): 1495-1504
- **PREPARATION AND CONDUCTIVITY OF THE LAYERED STRUCTURE J-PHASE OF ANHYDROUS CRYSTALLINE  $\text{Li}_2\text{Zr}(\text{PO}_4)_2$**  *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Wang, J. Q., Raistrick, I. D., Huggins, R. A.  
1989; 136 (9): 2529-2532
- **OXYGEN ORDERING, PHASE-SEPARATION AND THE 60-K AND 90-K PLATEAUS IN  $\text{YBa}_2\text{Cu}_3\text{O}_x$**  *NATURE*  
Beyers, R., Ahn, B. T., Gorman, G., Lee, V. Y., Parkin, S. S., Ramirez, M. L., Roche, K. P., Vazquez, J. E., Gur, T. M., Huggins, R. A.  
1989; 340 (6235): 619-621
- **HYDROGEN-TRANSPARENT METAL-SURFACES PRODUCED BY USE OF MOLTEN-SALTS WITH VERY LOW OXYGEN AND WATER ACTIVITIES** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
DEUBLEIN, G., Huggins, R. A.  
1989; 136 (8): 2234-2238
- **SYNTHESIS AND LITHIUM CONDUCTIVITIES OF  $\text{Li}_2\text{Sis}_3$  AND  $\text{Li}_4\text{Sis}_4$**  *MATERIALS RESEARCH BULLETIN*  
Ahn, B. T., Huggins, R. A.  
1989; 24 (7): 889-897
- **MATERIALS SCIENCE PRINCIPLES RELATED TO ALLOYS OF POTENTIAL USE IN RECHARGEABLE LITHIUM CELLS** *JOURNAL OF POWER SOURCES*  
Huggins, R. A.  
1989; 26 (1-2): 109-120
- **DEMONSTRATION OF A NOVEL COMPOSITE SOLID LIQUID SOLID ELECTROLYTE CONFIGURATION FOR HYDROGEN-RELATED APPLICATIONS** *ZEITSCHRIFT FUR PHYSIKALISCHE CHEMIE NEUE FOLGE*  
Liaw, B. Y., Huggins, R. A.  
1989; 164: 1533-1538
- **HYDROGEN-CONDUCTING ELECTROLYTE CONFIGURATIONS** *SOLID STATE IONICS*  
DEUBLEIN, G., Liaw, B. Y., Huggins, R. A.  
1988; 28: 1084-1088
- **CONTROLLED ELECTROLYTE ENVIRONMENTS AND THEIR USE FOR STUDYING AND MODIFYING MATERIALS PROPERTIES - POTENTIALS FOR EMPLOYMENT IN PRACTICAL DEVICES** *SOLID STATE IONICS*  
DEUBLEIN, G., Liaw, B. Y., Huggins, R. A.

1988; 28: 1078-1083

- **PHASE-BEHAVIOR IN THE LI-AL-O-H SYSTEM AT INTERMEDIATE TEMPERATURES** *SOLID STATE IONICS*  
CROUCHBAKER, S., Huggins, R. A.  
1988; 28: 611-616
- **THERMODYNAMIC PROPERTIES OF TITANIUM-NICKEL HYDRIDES** *SOLID STATE IONICS*  
MALYSCHREIBER, M., Huggins, R. A., Maly, K.  
1988; 28: 873-878
- **NOVEL ELECTROCHEMICAL HYDROGEN SENSORS FOR USE AT ELEVATED-TEMPERATURES** *SOLID STATE IONICS*  
DEUBLEIN, G., Liaw, B. Y., Huggins, R. A.  
1988; 28: 1660-1663
- **DC CONDUCTIVITY STUDIES ON LI5ALO4 AT INTERMEDIATE TEMPERATURES AND ITS POSSIBLE APPLICATION FOR THE ELECTROLYSIS OF WATER** *SOLID STATE IONICS*  
Cheng, L. Y., CROUCHBAKER, S., Huggins, R. A.  
1988; 28: 656-659
- **STUDIES OF SUPERCONDUCTING OXIDES WITH A SOLID-STATE IONIC TECHNIQUE** *PHYSICA C-SUPERCONDUCTIVITY AND ITS APPLICATIONS*  
Ahn, B. T., Gur, T. M., Huggins, R. A., Beyers, R., ENGLER, E. M., Grant, P. M., Parkin, S. S., Lim, G., Ramirez, M. L., Roche, K. P., Vazquez, J. E., Lee, V. Y., JACOWITZ, et al  
1988; 153: 590-593
- **POLYPHASE ALLOYS AS RECHARGEABLE ELECTRODES IN ADVANCED BATTERY SYSTEMS** *JOURNAL OF POWER SOURCES*  
Huggins, R. A.  
1988; 22 (3-4): 341-350
- **LITHIUM INSERTION IN SEVERAL MOLYBDENUM(IV) OXIDE PHASES AT ROOM-TEMPERATURE** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Huang, C. K., CROUCHBAKER, S., Huggins, R. A.  
1988; 135 (2): 408-412
- **IMPORTANCE OF ELECTRODE ZIRCONIA INTERFACE MORPHOLOGY IN HIGH-TEMPERATURE SOLID ELECTROLYTE CELLS** *JOURNAL OF APPLIED ELECTROCHEMISTRY*  
Gur, T. M., Huggins, R. A.  
1987; 17 (4): 800-806
- **THE FUTURE OF LITHIUM BATTERIES - ROUND-TABLE DISCUSSION** *JOURNAL OF POWER SOURCES*  
GABANO, J. P., Bro, P., Takehara, Z., Yamamoto, O., YAMAKI, ARMAND, Dey, OSAKA, SCROSATI, MOEHWALD, Iijima, WOLSKY, BELANGER, HUGGINS, Matsuda, WIESENER, POWERS, Halpert, IWAMARU, PELED, Levy, et al  
1987; 20 (3-4): 345-356
- **THERMODYNAMIC CHARACTERIZATION OF METAL HYDROGEN SYSTEMS BY ASSESSMENT OF PHASE-DIAGRAMS AND ELECTROCHEMICAL MEASUREMENTS** *INTERNATIONAL JOURNAL OF HYDROGEN ENERGY*  
LUDECKI, C. M., DEUBLEIN, G., Huggins, R. A.  
1987; 12 (2): 81-88
- **INVESTIGATIONS OF BINARY LITHIUM-ZINC, LITHIUM-CADMIUM AND LITHIUM-LEAD ALLOYS AS NEGATIVE ELECTRODES IN ORGANIC SOLVENT-BASED ELECTROLYTE** *SOLID STATE IONICS*  
Wang, J. Q., King, P., Huggins, R. A.  
1986; 20 (3): 185-189
- **BEHAVIOR OF SOME BINARY LITHIUM ALLOYS AS NEGATIVE ELECTRODES IN ORGANIC SOLVENT-BASED ELECTROLYTES** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Wang, J. Q., Raistrick, I. D., Huggins, R. A.  
1986; 133 (3): 457-460
- **STABILITY OF ALKALI ION-CONDUCTING SOLID AND LIQUID ELECTROLYTES - THERMODYNAMIC ASPECTS** *SOLID STATE IONICS*  
DEUBLEIN, G., Huggins, R. A.

1986; 18-9: 1110-1114

- **THE THERMODYNAMICS AND KINETICS OF THE GAMMA-LITHIUM VANADIUM BRONZE STRUCTURE** *SOLID STATE IONICS*  
Liaw, B. Y., Raistrick, I. D., Huggins, R. A.  
1986; 18-9: 828-832
- **THE ELECTROCHEMICAL INSERTION OF LITHIUM INTO BLEACHED POTASSIUM HEXATUNGSTATE THIN-FILMS - A NEW ELECTROCHEMICAL MATERIAL** *SOLID STATE IONICS*  
Joo, S. K., Raistrick, I. D., Huggins, R. A.  
1986; 18-9: 592-596
- **PROCEEDINGS OF THE 5TH INTERNATIONAL-CONFERENCE-ON-SOLID-STATE-IONICS, LAKE-TAHOE, CA, USA, AUGUST 18-24, 1985 .2. PREFACE** *SOLID STATE IONICS*  
Boyce, J. B., DeJonghe, L. C., Huggins, R. A.  
1986; 18-9: R9-R9
- **RAPID ANISOTROPIC DIFFUSION OF LITHIUM IN ELECTROCHROMIC THIN-FILMS BASED ON THE HEXAGONAL TUNGSTEN BRONZE STRUCTURE** *SOLID STATE IONICS*  
Joo, S., Raistrick, I. D., Huggins, R. A.  
1985; 17 (4): 313-318
- **ELECTROCHEMICAL INVESTIGATION OF HYDROGEN STORAGE IN METAL-HYDRIDES** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
LUEDECKE, C. M., DEUBLEIN, G., Huggins, R. A.  
1985; 132 (1): 52-56
- **PREPARATION OF HEXAGONAL POTASSIUM TUNGSTEN BRONZE THIN-FILMS BY THERMAL VACUUM EVAPORATION** *MATERIALS RESEARCH BULLETIN*  
Joo, S. K., Huggins, R. A.  
1985; 20 (11): 1265-1271
- **NEW ELECTROCHROMIC MATERIAL BASED ON THE ELECTROCHEMICAL INSERTION OF LITHIUM INTO BLEACHED POTASSIUM HEXATUNGSTATE** *MATERIALS RESEARCH BULLETIN*  
Joo, S. K., Raistrick, I. D., Huggins, R. A.  
1985; 20 (8): 897-904
- **GENERAL DISCUSSION, 2ND INTERNATIONAL MEETING ON LITHIUM BATTERIES, PARIS, APRIL 27, 1984** *JOURNAL OF POWER SOURCES*  
Owens, B. B., Bro, P., Lenfant, P., Ogawa, H., TOBIAS, C. W., Voss, E., Megahed, S., Taylor, H., WOLSKY, S., SCHLAIKJER, C., Huggins, R., Moshtev, R., Scrosati, et al  
1985; 14 (1-3): 259-266
- **RELATIONSHIPS AMONG ELECTROCHEMICAL, THERMODYNAMIC, AND OXYGEN POTENTIAL QUANTITIES IN LITHIUM-TRANSITION METAL-OXYGEN MOLTEN-SALT CELLS** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Godshall, N. A., Raistrick, I. D., Huggins, R. A.  
1984; 131 (3): 543-549
- **THE OXYGEN ION CONDUCTIVITY OF MULLITE PREPARED USING A WET CHEMICAL PROCESS** *SOLID STATE IONICS*  
Meng, G. Y., Huggins, R. A.  
1984; 11 (4): 271-278
- **METHANE SYNTHESIS ON NICKEL BY A SOLID-STATE IONIC METHOD** *SCIENCE*  
Gur, T. M., Huggins, R. A.  
1983; 219 (4587): 967-969
- **ON THE CO-IONIC CONDUCTIVITY IN  $\text{CaF}_2$**  *REVUE DE CHIMIE MINERALE*  
Wen, T. L., Huggins, R. A., Rabenau, A., Weppner, W.  
1983; 20 (4-5): 643-653
- **A NEW CHEMICAL METHOD FOR PREPARATION OF BOTH PURE AND DOPED MULLITE** *MATERIALS RESEARCH BULLETIN*  
Meng, G. Y., Huggins, R. A.  
1983; 18 (5): 581-588



- **THE KINETICS OF THE ELECTROCHEMICAL INSERTION OF LITHIUM INTO CUBIC SODIUM TUNGSTEN BRONZES** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
MARK, A. J., Raistrick, I. D., Huggins, R. A.  
1983; 130 (4): 776-782
- **AN ELECTROCHEMICAL STUDY OF THE MIXED BETA-VANADIUM BRONZES LIYNAXV2O5 AND LIYKXV2O5** *MATERIALS RESEARCH BULLETIN*  
Raistrick, I. D., Huggins, R. A.  
1983; 18 (3): 337-346
- **THE TRANSIENT ELECTRICAL RESPONSE OF ELECTROCHEMICAL SYSTEMS CONTAINING INSERTION REACTION ELECTRODES** *SOLID STATE IONICS*  
Raistrick, I. D., Huggins, R. A.  
1982; 7 (3): 213-218
- **ELECTROCATALYTIC SYNTHESIS OF METHANE ON STABILIZED ZIRCONIA FROM H2-CO2 MIXTURES** *SOLID STATE IONICS*  
Gur, T. M., Huggins, R. A.  
1981; 5 (OCT): 563-566
- **THERMODYNAMIC STUDY OF THE LITHIUM-TIN SYSTEM** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Wen, C. J., Huggins, R. A.  
1981; 128 (6): 1181-1187
- **SOME NON-BATTERY APPLICATIONS OF SOLID ELECTROLYTES AND MIXED CONDUCTORS** *SOLID STATE IONICS*  
Huggins, R. A.  
1981; 5 (OCT): 15-20
- **ELECTROCHEMICAL INVESTIGATION OF THE LITHIUM-GALLIUM SYSTEM** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Wen, C. J., Huggins, R. A.  
1981; 128 (8): 1636-1641
- **ALL-SOLID LITHIUM ELECTRODES WITH MIXED-CONDUCTOR MATRIX** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Boukamp, B. A., LESH, G. C., Huggins, R. A.  
1981; 128 (4): 725-729
- **ANION DISORDER OF BETA-PBF2 IN SUPERIONIC STATE BY X-RAY-DIFFRACTION** *SOLID STATE IONICS*  
Koto, K., SCHULZ, H., Huggins, R. A.  
1981; 3-4 (AUG): 381-384
- **CHEMICAL DIFFUSION IN INTERMEDIATE PHASES IN THE LITHIUM-SILICON SYSTEM** *JOURNAL OF SOLID STATE CHEMISTRY*  
Wen, C. J., Huggins, R. A.  
1981; 37 (3): 271-278
- **THERMODYNAMICS AND KINETICS OF THE ELECTROCHEMICAL INSERTION OF LITHIUM INTO TUNGSTEN BRONZES** *SOLID STATE IONICS*  
Raistrick, I. D., MARK, A. J., Huggins, R. A.  
1981; 5 (OCT): 351-354
- **SILVER IONIC AND ELECTRONIC CONDUCTIVITY IN AG9GAS6, AG9AIS6, AGGAS2, AGAIS2, AND AGAL5S8** *JOURNAL OF SOLID STATE CHEMISTRY*  
Hellstrom, E. E., Huggins, R. A.  
1980; 35 (2): 207-214
- **THERMODYNAMIC AND MASS-TRANSPORT PROPERTIES OF LIIN** *MATERIALS RESEARCH BULLETIN*  
Wen, C. J., Huggins, R. A.  
1980; 15 (9): 1225-1234
- **ELECTROCHEMICAL INVESTIGATION OF SOLUBILITY AND CHEMICAL DIFFUSION OF LITHIUM IN ALUMINUM** *METALLURGICAL TRANSACTIONS B-PROCESS METALLURGY*  
Wen, C. J., Weppner, W., Boukamp, B. A., Huggins, R. A.

1980; 11 (1): 131-137

- **CHEMICAL DIFFUSION IN INTERMEDIATE PHASES IN THE LITHIUM-TIN SYSTEM** *JOURNAL OF SOLID STATE CHEMISTRY*  
Wen, C. J., Huggins, R. A.  
1980; 35 (3): 376-384
- **THERMODYNAMIC INVESTIGATIONS OF TERNARY LITHIUM-TRANSITION METAL-OXYGEN CATHODE MATERIALS** *MATERIALS RESEARCH BULLETIN*  
Godshall, N. A., Raistrick, I. D., Huggins, R. A.  
1980; 15 (5): 561-570
- **IONIC-CONDUCTIVITY OF 8MOL.-PERCENTS $\text{CaO}$ - $\text{ZrO}_2$  MEASURED BY USE OF BOTH AC AND DC TECHNIQUES** *MATERIALS SCIENCE AND ENGINEERING*  
Gur, T. M., Raistrick, I. D., Huggins, R. A.  
1980; 46 (1): 53-62
- **STEADY-STATE DC POLARIZATION CHARACTERISTICS OF THE  $\text{O}_2$ , PT-STABILIZED ZIRCONIA INTERFACE** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Gur, T. M., Raistrick, I. D., Huggins, R. A.  
1980; 127 (12): 2620-2628
- **APPLICATION OF AC TECHNIQUES TO THE STUDY OF LITHIUM DIFFUSION IN TUNGSTEN TRIOXIDE THIN-FILMS** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Ho, C., Raistrick, I. D., Huggins, R. A.  
1980; 127 (2): 343-350
- **PREPARATION OF ALUMINUM SULFIDE** *MATERIALS RESEARCH BULLETIN*  
Hellstrom, E. E., Huggins, R. A.  
1979; 14 (1): 127-132
- **THERMODYNAMIC AND MASS-TRANSPORT PROPERTIES OF  $\text{LiAlO}_2$**  *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Wen, C. J., Boukamp, B. A., Huggins, R. A., Weppner, W.  
1979; 126 (12): 2258-2266
- **STUDY OF THE SYSTEMS  $\text{Li}_2\text{S}-\text{Al}_2\text{S}_3$ ,  $\text{Na}_2\text{S}-\text{Al}_2\text{S}_3$ ,  $\text{K}_2\text{S}-\text{Al}_2\text{S}_3$  - PREPARATION, PHASE STUDY AND ELECTRICAL-CONDUCTIVITY** *MATERIALS RESEARCH BULLETIN*  
Hellstrom, E. E., Huggins, R. A.  
1979; 14 (7): 881-889
- **DECOMPOSITION OF NITRIC-OXIDE ON ZIRCONIA IN A SOLID-STATE ELECTROCHEMICAL-CELL** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Gur, T. M., Huggins, R. A.  
1979; 126 (6): 1067-1075
- **IONIC-CONDUCTIVITY IN LITHIUM IMIDE** *PHYSICS LETTERS A*  
Boukamp, B. A., Huggins, R. A.  
1979; 72 (6): 464-466
- **ELECTROCHEMICAL METHODS FOR DETERMINING KINETIC-PROPERTIES OF SOLIDS** *ANNUAL REVIEW OF MATERIALS SCIENCE*  
Weppner, W., Huggins, R. A.  
1978; 8: 269-311
- **FAST IONIC-CONDUCTIVITY IN LITHIUM NITRIDE** *MATERIALS RESEARCH BULLETIN*  
Boukamp, B. A., Huggins, R. A.  
1978; 13 (1): 23-32
- **THERMODYNAMIC PROPERTIES OF INTERMETALLIC SYSTEMS LITHIUM-ANTIMONY AND LITHIUM-BISMUTH** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Weppner, W., Huggins, R. A.  
1978; 125 (1): 7-14

- **CONDITIONS FOR ENHANCED CHEMICAL DIFFUSION OF IONS IN POLYMERS - REVIEW** *MACROMOLECULES*  
Huggins, R. A., HUGGINS, J. M.  
1977; 10 (5): 889-892
- **IONIC-CONDUCTIVITY OF SOME LITHIUM SILICATES AND ALUMINOSILICATES** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Franklin, A. D., YOUNG, K. F., Raistrick, I. D., Ho, C., Huggins, R. A.  
1977; 124 (6): 871-873
- **STRUCTURAL ASPECTS OF SOME MIXED METAL FERROCYANIDES** *JOURNAL OF INORGANIC & NUCLEAR CHEMISTRY*  
Raistrick, I. D., ENDOW, N., LEWKOWITZ, S., Huggins, R. A.  
1977; 39 (10): 1779-1783
- **MORPHOLOGICAL STABILITY OF A PLANE INTERFACE DURING ELECTROCRYSTALLIZATION FROM MOLTEN-SALTS** *JOURNAL OF CRYSTAL GROWTH*  
Huggins, R. A., Elwell, D.  
1977; 37 (2): 159-162
- **IONIC-CONDUCTIVITY AND ELECTRODE EFFECTS ON BETA-PBF2** *JOURNAL OF ELECTROANALYTICAL CHEMISTRY*  
Raistrick, I. D., Ho, C., HU, Y. W., Huggins, R. A.  
1977; 77 (3): 319-337
- **IONIC-CONDUCTIVITY OF SOLID AND LIQUID  $\text{LiAlCl}_4$**  *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Weppner, W., Huggins, R. A.  
1977; 124 (1): 35-38
- **RECENT RESULTS ON LITHIUM ION CONDUCTORS** *ELECTROCHIMICA ACTA*  
Huggins, R. A.  
1977; 22 (7): 773-781
- **ELECTROCHEMICAL INVESTIGATION OF CHEMICAL DIFFUSION, PARTIAL IONIC CONDUCTIVITIES, AND OTHER KINETIC-PARAMETERS IN  $\text{Li}_3\text{SB}$  AND  $\text{Li}_3\text{BI}$**  *JOURNAL OF SOLID STATE CHEMISTRY*  
Weppner, W., Huggins, R. A.  
1977; 22 (3): 297-308
- **DETERMINATION OF KINETIC-PARAMETERS OF MIXED-CONDUCTING ELECTRODES AND APPLICATION TO SYSTEM  $\text{Li}_3\text{SB}$**  *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Weppner, W., Huggins, R. A.  
1977; 124 (10): 1569-1578
- **IONIC-CONDUCTIVITY OF LITHIUM ORTHOSILICATE - LITHIUM PHOSPHATE SOLID-SOLUTIONS** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
HU, Y. W., Raistrick, I. D., Huggins, R. A.  
1977; 124 (8): 1240-1242
- **ELECTROCHEMICAL STUDIES OF PARABOLIC REACTION-RATES AND THERMODYNAMIC PROPERTIES** *ZEITSCHRIFT FUR PHYSIKALISCHE CHEMIE-FRANKFURT*  
Weppner, W., Huggins, R. A.  
1977; 108 (1): 105-122
- **IONIC-CONDUCTIVITY OF SOME LITHIUM SILICATES AND ALUMINOSILICATES** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Raistrick, I. D., Ho, C., Huggins, R. A.  
1976; 123 (10): 1469-1476
- **LITHIUM ION CONDUCTION IN  $\text{Li}_5\text{AlO}_4$ ,  $\text{Li}_5\text{GaO}_4$  AND  $\text{Li}_6\text{ZnO}_4$**  *MATERIALS RESEARCH BULLETIN*  
Raistrick, I. D., Ho, C., Huggins, R. A.  
1976; 11 (8): 953-957
- **REACTION OF ANTIMONY PENTAFLUORIDE WITH POLY (CARBON MONOFLUORIDE)** *MATERIALS RESEARCH BULLETIN*  
Ebert, L. B., Huggins, R. A., Brauman, J. I.  
1976; 11 (6): 615-620

- **ELECTRICAL-PROPERTIES OF UNDOPED AND DOPED POTASSIUM TETRAFLUOROALUMINATE -  $KAlF_4$**  *JOURNAL OF SOLID STATE CHEMISTRY*  
Schoonman, J., Huggins, R. A.  
1976; 16 (3-4): 413-422
- **CRYSTAL-GROWTH BY ELECTROCHEMICAL CZOCHRALSKI TECHNIQUE (ECT)** *JOURNAL OF CRYSTAL GROWTH*  
DeMattei, R. C., Huggins, R. A., Feigelson, R. S.  
1976; 34 (1): 1-10
- **IONIC-CONDUCTIVITY OF  $Li_4GeO_4$ ,  $Li_2GeO_3$  AND  $Li_2Ge_7O_{15}$**  *MATERIALS RESEARCH BULLETIN*  
Liebert, B. E., Huggins, R. A.  
1976; 11 (5): 533-538
- **BASIC RESEARCH IN MATERIALS SCIENCE**  
Huggins, R. A.  
1976; 191 (4228): 647-650
- **IONIC-CONDUCTIVITY OF LITHIUM PHOSPHATE DOPED LITHIUM ORTHOSILICATE** *MATERIALS RESEARCH BULLETIN*  
HU, Y. W., Raistrick, I. D., Huggins, R. A.  
1976; 11 (10): 1227-1230
- **CALCULATION OF MOTIONAL ACTIVATION-ENERGIES FOR INTERSTITIAL IONS IN RUTILE STRUCTURE USING A MINIMUM ENERGY PATH MODEL** *JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS*  
Ajayi, O. B., NAGEL, L. E., Raistrick, I. D., Huggins, R. A.  
1976; 37 (2): 167-172
- **DC RESISTANCES IN ELECTROLYTIC CRYSTALLIZATION FROM MOLTEN-SALTS** *JOURNAL OF CRYSTAL GROWTH*  
Elwell, D., DeMattei, R. C., ZUBECK, I. V., Feigelson, R. S., Huggins, R. A.  
1976; 33 (2): 232-238
- **LITHIUM ION CONDUCTIVITY IN LITHIUM NITRIDE** *PHYSICS LETTERS A*  
Boukamp, B. A., Huggins, R. A.  
1976; 58 (4): 231-233
- **IONIC-CONDUCTIVITY OF ALKALI-METAL CHLOROALUMINATES** *PHYSICS LETTERS A*  
Weppner, W., Huggins, R. A.  
1976; 58 (4): 245-248
- **GROWTH OF LANTHANUM HEXABORIDE SINGLE-CRYSTALS BY MOLTEN-SALT ELECTROLYSIS** *JOURNAL OF CRYSTAL GROWTH*  
ZUBECK, I. V., Feigelson, R. S., Huggins, R. A., PETTIT, P. A.  
1976; 34 (1): 85-91
- **ELECTRICAL-PROPERTIES OF  $K_2FeCl_5 \cdot H_2O$  AND  $K_2AlF_5$**  *JOURNAL OF SOLID STATE CHEMISTRY*  
Schoonman, J., Hellstrom, E. E., Huggins, R. A.  
1976; 18 (4): 325-328
- **IONIC MOTION IN BETA-PBF2** *JOURNAL OF APPLIED PHYSICS*  
Schoonman, J., Ebert, L. B., Hsieh, C. H., Huggins, R. A.  
1975; 46 (7): 2873-2876
- **SURFACE-STRUCTURE AND ELECTROLYTIC GROWTH STABILITY OF  $LaB_6$  CRYSTALS** *JOURNAL OF CRYSTAL GROWTH*  
Elwell, D., ZUBECK, I. V., Feigelson, R. S., Huggins, R. A.  
1975; 29 (1): 65-68
- **PHASES IN SYSTEM  $NaAlO_2$ - $Al_2O_3$**  *JOURNAL OF THE AMERICAN CERAMIC SOCIETY*  
ELLIOT, A. G., Huggins, R. A.  
1975; 58 (11-1): 497-500
- **COMPOSITION DEPENDENCE OF IONIC-CONDUCTIVITY** *JOURNAL OF PHYSICS AND CHEMISTRY OF SOLIDS*  
Schoonman, J., Huggins, R. A.

---

1975; 36 (7-8): 815-817

- **CATALYTIC DECOMPOSITION OF NITRIC-OXIDE ON ZIRCONIA BY ELECTROLYTIC REMOVAL OF OXYGEN** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Pancharatnam, S., Huggins, R. A., Mason, D. M.  
1975; 122 (7): 869-875
- **NATURE OF CHROMIUM TRIOXIDE INTERCALATION IN GRAPHITE** *CARBON*  
Ebert, L. B., Huggins, R. A., Brauman, J. I.  
1974; 12 (2): 199-208
- **WIDE LINE NUCLEAR MAGNETIC-RESONANCE OF F-19 IN GRAPHITE ANTIMONY PENTAFLUORIDE - EVIDENCE FOR RAPID MOTION OF INTERCALATED SPECIES** *JOURNAL OF THE CHEMICAL SOCIETY-CHEMICAL COMMUNICATIONS*  
Ebert, L. B., Huggins, R. A., Brauman, J. I.  
1974: 924-925
- **CARBON MONOFLUORIDE - EVIDENCE FOR A STRUCTURE CONTAINING AN INFINITE ARRAY OF CYCLOHEXANE BOATS** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*  
Ebert, L. B., Brauman, J. I., Huggins, R. A.  
1974; 96 (25): 7841-7842
- **MECHANISM AND KINETICS OF NICKEL CHROMITE FORMATION** *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*  
Armijo, J. S., Douglass, D. L., Huggins, R. A.  
1973; 120 (6): 825-833
- **COERCIVE FORCE OF IRON RESULTING FROM INTERACTION OF DOMAIN BOUNDARIES WITH LARGE NONMAGNETIC INCLUSIONS** *PHYSICAL REVIEW A-GENERAL PHYSICS*  
Nix, W. D., Huggins, R. A.  
1964; 135 (2A): A401-?
- **DOMAIN CONFIGURATIONS ABOUT NONMAGNETIC PARTICLES IN IRON** *PHYSICAL REVIEW*  
Nix, W. D., Huggins, R. A.  
1961; 121 (4): 1038-?