



# NASF/AESF Foundation Research Reports



## Research Projects Listing (1945-2021)

**NOTE:** Any missing numbers are projects that were proposed, but not funded. This listing does not include the original set of projects undertaken at the National Bureau of Standards prior to World War II, or the Small Grants Program instituted in the 1990s and 2000s.

**Project R-1** (Duration 1945 – 1947) PROCESSES

Stripping of Copper from Various Base Metals; Indiana University

**Project R-2** (Duration 1945 – 1953) TESTING & CONTROL

Determination of Impurities in Electroplating Solutions; Lehigh University

**Project R-3** (Duration 1945 – 1950) FUNDAMENTALS

Adhesion of Electrodeposits; University of Michigan

**Project R-4** (Duration 1947 – 1953) SURFACE PREPARATION

Effect of Surface Finishing of Non-ferrous Base Metals on the Protective Value of Plated Coatings; Timex Group, Ltd.

**Project R-5** (Duration 1947 – 1956) PROCESSES

Effect of Impurities & Purification of Electroplating Solutions (Nickel); Michigan State University

**Project R-6** (Duration 1947 – 1954) FUNDAMENTALS

Porosity of Electrodeposited Metals; Princeton University

**Project R-7** (Duration 1947 – 1950) TESTING & CONTROL

Methods for Testing Thickness of Electrodeposits; Pennsylvania State University

**Project R-8** (Duration 1945 – 1949) FUNDAMENTALS

Polarization & Overvoltage: Selected Bibliographic Abstracts; University of Michigan

**Project R-9** (Duration 1948 – 1951) PROPERTIES OF COATINGS

Physical Properties of Electrodeposited Metals (Nickel); National Bureau of Standards (now the National Institute of Standards & Technology—NIST)

**Project R-10** (Duration 1948 – 1960) ENVIRONMENTAL

Disposal of Plating Room Wastes; Yale University

**Project R-11** (Duration 1949 – 1952) FUNDAMENTALS

Current & Metal Distribution in Electrodeposition; University of Evansville

**Project R-12** (Duration 1950 – 1965) PROCESSES

Cleaning & Preparation of Metals for Electroplating; Columbia University

**Project R-13** (Duration 1954 – 1961) FUNDAMENTALS

The Nature, Cause & Effect of Porosity in Electrodeposits; National Bureau of Standards (now the National Institute of Standards & Technology—NIST)



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**Project R-14** (Duration 1953 – 1965) SURFACE PREPARATION

Influence of the Physical Metallurgy & Mechanical Processing of the Basis Metal of Electroplating; Ontario Research Foundation

**Project R-15** (Duration 1952 – 1966) TESTING & CONTROL

Development of Accelerated Corrosion Tests for Electroplated Coatings; The Udylite Corporation

**Project R-16** (Duration 1955 – 1966) FUNDAMENTALS

Mechanism of Electrodeposition; University of Pennsylvania

**Project R-17** (Duration 1957 – 1961) FUNDAMENTALS

Microthrowing Power; Virginia Institute for Scientific Research

**Project R-18** (Duration 1960 – 1966) SURFACE PREPARATION

Mechanical Finishing of Metal Surfaces; Chicago Electroplater's Institute

**Project R-19** (Duration 1962 – 1966) FUNDAMENTALS

Galvanic Effects Associated with Coating Failure; National Bureau of Standards (now the National Institute of Standards & Technology—NIST)

**Project R-20** (Duration 1962 – 1967) PROCESSES

Plating by Thermal Decomposition; University of Texas at Arlington

**Project R-21** (Duration 1964 – 1968) PROPERTIES OF COATINGS

Physical & Mechanical Properties of Electrodeposited Copper; National Bureau of Standards (now the National Institute of Standards & Technology—NIST)

**Project R-22** (Duration 1964 – 1969) FUNDAMENTALS

Origins of Stress in Electrodeposits; Stevens Institute of Technology

**Project R-23** (Duration 1964 – 1967) FUNDAMENTALS

Study of the Initial Stages of Nickel Deposition; Ontario Research Foundation

**Project R-24** (Duration 1965 – 1968) FUNDAMENTALS

Mechanism of Copper Electrocrystallization; University of Pennsylvania

**Project R-25** (Duration 1965 – 1971) PROPERTIES OF COATINGS

Mechanical Properties of Electrodeposited Gold; University of Southern California

**Project R-26** (1967; published as *Handbook of Properties of Electrodeposited Metals*, PROPERTIES OF COATINGS; Properties of Electrodeposited Metals; Battelle Columbus Laboratories

**Project R-27** (Duration 1967 – 1975) PROCESSES

Study of Structural Changes Occurring on the Aluminum Surface During the Anodizing & Sealing Process; Worcester Polytechnic Institute



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**Project R-28** (Duration 1967 – 1968) PROCESSES

Barrel Zinc Plating of Carbonitrided Steel Parts; Pennsylvania State University

**Project R-29** (Duration 1968 – 1977) FUNDAMENTALS

Interdiffusion of Electrodeposits with Basis Metals; Pennsylvania State University

**Project R-30** (Duration 1969 – 1975) PROPERTIES OF COATINGS

Crystal Defects in Electrodeposits; Stevens Institute of Technology

**Project R-31** (Duration 1969 – 1973) ENVIRONMENTAL

Application of Reverse Osmosis to Electroplating Waste Treatment; Ontario Research Foundation

**Project R-32** (Duration 1971 - 1974) ENVIRONMENTAL

Treatment of Electroplating Wastes by Reverse Osmosis; Walden Research Division of Abcor, Inc.

**Project R-33** (Duration 1971 – 1975) PROPERTIES OF COATINGS

Mechanical Properties of Electrodeposited Brass; National Bureau of Standards (now the National Institute of Standards & Technology—NIST)

**Project R-34** (Duration 1972 – 1976) PROCESSES

Optimization of Barrel Plating Solutions; Arizona State University

**Project R-35** (Duration 1975 – 1976) FUNDAMENTALS

Application of Pulsed Plating Techniques; Columbia University

**Project R-36** (Duration 1974 – 1975) ENVIRONMENTAL

New Membranes for Treating Metal Finishing Effluents by Reverse Osmosis; Midwest Research Institute

**Project R-37** (Duration 1975 – 1976) ENVIRONMENTAL

PBI Reverse Osmosis Membrane for Chromium Plating Rinse Water; Celanese Research Laboratory

**Project R-38** (Duration 1976 – 1980) PROPERTIES

Property Structure Relationships in Nickel Electrodeposits; Stevens Institute of Technology

**Project R-39** (Duration 1976 – 1977) ENVIRONMENTAL

Evaluation of Reverse Osmosis Membranes for Treatment of Electroplating Rinse Waste; Walden Division of Abcor, Inc.

**Project R-40** (Duration 1976 – 1978) ENVIRONMENTAL

Contaminant Build-up in the Plating Bath Resulting from Closed Loop Operation; Ontario Research Foundation

**Project R-41** (Duration 1977 – 1980) PROCESSES

Plating on Aluminum; National Bureau of Standards (now the National Institute of Standards & Technology—NIST)



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## Research Projects Listing (1945-2021)

**Project R-42** (Duration 1977 – 1980) PROCESSES

Adhesion of electroplating to Complex ABS Substrates; Crown City Plating Company

**Project R-43** (Duration 1976 – 1977) ENVIRONMENTAL

Coupled Transport Systems for Control of Heavy Metal Pollutants in Metal Finishing Solutions; Bend Research, Inc.

**Project R-44** (Duration 1976 – 1980) PROCESSES

The Optimization of Barrel Zinc Plating Solutions & a New Current Distribution Cell; Motorola Semiconductor Products Inc.

**Project R-45** (Duration 1977 – 1979) ENVIRONMENTAL

Demonstration of Zinc Cyanide Recovery Using Reverse Osmosis & Evaporation; Walden Division of Abcor, Inc.

**Project R-46** (Duration 1977 – 1978) ENERGY CONSERVATION

Energy Conservation Study of the Plating & Surface Finishing Industry; Georgia Institute of Technology

**Project R-48** (Duration 1979 – 1981) ENVIRONMENTAL

The Zeta-potential of Zinc Suspensions in Electroplating Waste Streams; Columbia University

**Project R-49** (Duration 1979) ENVIRONMENTAL

The Effect of Electroplating Wastewater Sludge as an Admixture on the Physical Properties of Concrete; Manhattan College

**Project R-50** (Duration 1979 – 1980) FUNDAMENTALS

Grain Boundary Diffusion in Gold Electrodeposits; Pennsylvania State University

**Project R-51** (Duration 1979 – 1980) ENVIRONMENTAL

Evaluation of Solvents for Immiscible Rinsing of Plating Solutions; United Technologies Corporation

**Project R-52** (Duration 1978 – 1980) TESTING & CONTROL

A Kinetic Method for Analysis of Cyanide Ion in Electroplating Effluents; Manhattan College

**Project R-53** (Duration 1979 – 1980) ENVIRONMENTAL

Development of a Reactor to Eliminate Cyanides in Electroplating Effluents; Ontario Research Foundation

**Project R-53A** (Duration 1980 – 1982) ENVIRONMENTAL

Demonstration of a Batch Hydrolysis System for the Destruction of Cyanide in Electroplating Effluents; Ontario Research Foundation

**Project R-55** (Duration 1979 – 1980) ENVIRONMENTAL

Electroplating Waste Water Sludge Characterization; Centec Corporation



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**Project R-56** (Duration 1979) ENVIRONMENTAL

Electrolytic Treatment of Oily Wastewater from Manufacturing & Machining Plants; Industrial Environmental Research Laboratory

**Project R-58** (Duration 1981 – 1983) PROCESSES

Electrodeposition of Heat & Corrosion-resistant Alloys; National Bureau of Standards (now the National Institute of Standards & Technology—NIST)

**Project R-60** (Duration 1982 – 1984) ENVIRONMENTAL

Fabrication & Pilot Scale Testing of a Prototype Donnan Dialyzer for the Removal of Toxic Metals from Electroplating Rinse Waters; Southwest Research Institute

**Project R-61** (Duration 1982 – 1983) PROPERTIES OF COATINGS

Electrodeposition of Anodized Aluminum; Reynolds Metals Company

**Project R-62** (Duration 1983 – 1986) PROPERTIES OF COATINGS

Relationships Between the Structure & Some Electrochemical Properties of Electrodeposited Copper; Stevens Institute of Technology

**Project R-63** (Duration 1983 – 1984) ENVIRONMENTAL

Evaluation of New & Emerging Technologies in the Metal Finishing Industry; University of Central Florida

**Project R-64** (Duration 1983 – 1985) ENVIRONMENTAL

Destruction of Volatile Organic Compound by a Catalytic Paint Drying Device; University of Central Florida

**Project R-65** (Duration 1983 – 1987) TESTING & CONTROL

The Development of a Corrosion Test for Zinc Coatings: Photo-electrochemical Methods; Univ. of Akron

**Project R-66** (Duration 1984 – 1986) FUNDAMENTALS

Gas & Solid Particle Pitting in Nickel Electroplating; Carnegie Mellon University

**Project R-67** (Duration 1985 – 1989) PROPERTIES OF COATINGS

Low Temperature Interdiffusion & a Transmission Electron Microscope Grain Size Study of Palladium Electrodeposits; Pennsylvania State University

**Project R-68** (Duration 1985 – 1989) FUNDAMENTALS

Selective Pulse Plating; Clarkson University

**Project R-69** (Duration 1988 – 1989) PROPERTIES OF COATINGS

Mechanical Properties of Electrodeposits; Stevens Institute of Technology

**Project R-70** (Duration 1987 – 1990) TESTING & CONTROL

Application of Electrochemical Techniques in Characterizing Plating Baths; University of Missouri – Rolla



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**Project R-71** (Duration 1986 – 1987) ENVIRONMENTAL

Factors Which Affect the Success of Metal/Chemical Recovery Installations in the Metals Industry;  
Ontario Research Foundation

**Project R-72** (Duration 1988 – 1990) PROCESSES

Electrolytic and Electroless Preparation of III-V Compounds of Gallium & Indium; Forschungsinstitut für Edelmetalle und Metallchemie

**Project R-73** (Duration 1988 – 1990) TESTING & CONTROL

Chemical Sensors for Iron & Chrome Solutions in Plating Solutions; Case Western Reserve University

**Project R-74** (Duration 1987 – 1990) FUNDAMENTALS

Investigation of the Mechanism of Polishing Effects by Organic Additives Used in Electroplating;  
University of Guelph

**Project R-75** (Duration 1989 – 1990) ENVIRONMENTAL

Novel & Inexpensive Treatment for Plating Wastes; University of Washington

**Project R-76** (Duration 1989 – 1992) FUNDAMENTALS

Kinetics of Intermediate Phase Formation in the Iron-Zinc System; Pennsylvania State University

**Project R-77** (Duration 1990 – 1991) PROPERTIES OF COATINGS

Wear Testing of Improved Chromium Films; University of Central Florida

**Project R-78** (Duration 1990 – 1993) ENVIRONMENTAL

Recovery of Precious Metals with a Plating Barrel; Clarkson University

**Project R-79** (Duration 1990 – 1993) ENVIRONMENTAL

Electrochemical Treatment of Metal Plating Wastes; University of California at Los Angeles

**Project R-80** (Duration 1990 – 1992) FUNDAMENTALS

Effect of Filming Additives on Electrodeposition; Baylor University

**Project R-81** (Duration 1990 – 1995) ENVIRONMENTAL

Estimation Techniques for Multi-Media Pollutant Releases from Surface Finishing Operations; University of Central Florida/U.S. EPA

**Project R-82** (Duration 1991- 1993) TESTING & CONTROL

Chemical Ion Sensors for Plating Baths; Case Western Reserve University

**Project R-83** (Duration 1991 – 1992) PROCESSES

Electrochemical Formation of Multilayer Sandwich Type Fe-Ni Alloy of Controlled Composition Using Pulsed Technique; University of South Carolina



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**Project R-84** (Duration 1991 – 1993) PROCESSES

Electrochemical Deposition of Particulate Alloy; Israel Institute of Metals

**Project R-85** (Duration 1991 – 1992) FUNDAMENTALS

Study of Microdistribution of Electrodeposited Nickel-Indium Alloys; Mendeleyev Institute of Chemical Technology

**Project R-86** (Duration 1992 – 1995) PROCESSES

Deposition of Semiconducting Materials with Unique Structures; Johns Hopkins University

**Project R-88** (Duration 1992 – 1995) PROCESSES

Pulsed Electrodeposition of Pb-Sn Solder Alloys from Sulfonate Electrolytes; Stevens Inst. of Technology

**Project R-89** (Duration 1993 – 1994) ENVIRONMENTAL

Electroregeneration of Chromate Solutions; Mendeleyev Institute of Technology

**Project R-90** (Duration 1993 – 1996) PROPERTIES OF COATINGS

Effect of Microstructure of the Steel Substrate & Bath Stabilizers on the Porosity of Electroless Nickel Coatings; Clarkson University

**Project R-91** (Duration 1994 – 1996) PROCESSES

Copper Deposition from Cuprous Ligand Complexes: A Contribution Toward the Replacement of Cyanide in Strike Plating Baths; North Carolina State University

**Project R-92** (Duration 1995 - 1996) PROCESSES

Research and Development of Alkyl Sulfonate Electrolytes; Mendeleyev Institute of Technology

**Project R-93** PROCESSES

Electroplating of Thin Films of Zn/Ni/SiO<sub>2</sub> Composites onto Steel to Prevent Corrosion & Hydrogen Embrittlement, University of South Carolina

**Project R-94** PROCESSES

Research & Design of Electrolyte on the Base of Alkyl-Sulfonic Acids for Nickel Plating, Mendeleyev Institute of Technology

**Project R-95** ENVIRONMENTAL

Interlaboratory Analytical Method Validation Studies for Trace Metals in Metal Waste Effluents; University of California at Los Angeles

**Project R-96** ENVIRONMENTAL

Source Reduction Through Process Modification & Operational Improvement Enhancement Application of Decision Support Systems in Electroplating Plants; Wayne State University

**Project R-97** FUNDAMENTAL

Effect of Leveling Maximum in Low-Frequency Pulse Plating with Additives; Technical University, Sofia, Bulgaria



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## Research Projects Listing (1945-2021)

### **Project R-98 PROCESSES**

Pulse Plating of Hard Chromium from Trivalent Baths; Clarkson University

### **Project R-99 FUNDAMENTALS**

A Study of the Anodic & Passive Behavior of Electrodeposited Alloys; Pennsylvania State University

### **Project R-103 FUNDAMENTALS**

Pulse Periodic Reverse Plating – Theoretical Considerations for Effective Applications; Technical University, Sofia, Bulgaria

### **Project R-105 (Duration 2002-2004) PROCESSES**

Controlled Formation of Conversion Coatings & Anodic Films by Using Periodic Pulse Reverse Techniques; Technical University, Sofia, Bulgaria / University of Notre Dame

### **Project R-106 (Duration 2002) ENVIRONMENTAL**

Recycling Cr(VI) Spent Solutions by a Low-Cost Chemical Method; Ecole Nationale Supérieure des Mines

### **Project R-107 (Duration 2001-2004) PROCESSES**

Development of a New Process for Plating Zn-Ni-P-X (X – Sn, Pb, Bi, Ce, Mo or Cd) Quaternary Alloys on Steel to Prevent Corrosion & Hydrogen Embrittlement; University of South Carolina

### **Project R-108 ENVIRONMENTAL**

Cyanide Removal Evaluation for MP&M Regulations; The Policy Group (Washington, DC)

### **Project R-109 (Duration 2002-2005) PROCESSES**

Development of an Environmentally-Friendly Corrosion Preventive Deposit on Steel; Pennsylvania State University

### **Project R-110 (Duration 2002-2004) ENVIRONMENTAL**

The Role of Surface Potential in the Development of Environmentally Benign Metal Cleaning & Degreasing Technologies; University of Tennessee

### **Project R-111 (Duration 2002-2005) PROCESSES**

Improved Silane Film Performance by Electrodeposition; University of Cincinnati

### **Project R-112 (Duration 2003-2005) PROCESSES**

Simultaneous Electrodeposition of Pb-free Alloy Films for Microelectronic Packaging Applications; University of Alberta

### **Project R-113 (Duration 2004-2005) PROCESSES**

Electrodeposition of Nanocomposite Films by Impinging Jet Electrode; Univ. of California at San Diego

### **Project R-114 (Duration 2004-2006) PROPERTIES OF COATINGS**

Effect of Material Characteristics and Surface Processing Variables on Hydrogen Embrittlement of Steel Fasteners; McGill University (Québec)





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**Project R-115** (Duration 2004-2005) PROPERTIES OF COATINGS

High Performance Magnetic Electrodeposits for Nano / Micro Electro-Mechanical Systems; University of California at Riverside

**Project R-117** (Duration 2013-2016) PROCESSES

Electrodeposition of Ni-Fe-Mo-W Alloys; Northeastern University (Boston)

**Project R-118** (Duration 2016-2019) PROPERTIES OF COATINGS

Crack Formation during Electrodeposition and Post-deposition Aging of Thin Film Coatings; University of Houston (Texas)

**Project R-119** (Duration 2018-2020) PROCESSES

Electro-codeposition of MCrAlY Coatings for Advanced Gas Turbine Applications; Tennessee Technological University

**Project R-120** (Duration 2019-2021) ENVIRONMENTAL

Electrochemical Destruction of Perfluorooctanesulfonate in Electroplating Wastewaters; University of Illinois at Chicago

**Project R-121** (Duration 2020-2022) SUSTAINABILITY

Development of a Sustainability Metrics System and a Technical Solution Method for Sustainable Surface Finishing; Wayne State University (Detroit)

**Project R-122** (Duration 2021-2024) ENVIRONMENTAL

Electrochemical Approaches to Treatment of PFAS in Plating Wastewater; University of Georgia - Griffin Campus