Interview With the 1998 AESF Scientific Achievement Award Winner: Dr. George Di Bari

Dr. George A. Di Bari is the 1998 recipient of the AESF Scientific Achievement Award. The announcement was made during the SUR/FIN® '98 Conference and Exhibit in Minneapolis, MN, June 24. The award is the Society's most prestigious one for technical and practical contributions in the field of surface finishing. As the 1998 award-winner, he will deliver the William Blum Lecture during the opening ceremonies at next year's SUR/FIN® in Cincinnati, OH.

Dr. George A. Di Bari has been involved with surface finishing and the allied fields of electrochemistry, corrosion and metallurgy since 1955. He spent 20 years in Inco's Research and Development Department, where he specialized in studies of the anodic behavior of nickel, the corrosion performance of decorative, electroplated nickel plus chromium coatings, and alloy plating.

He left Inco from 1967 to 1971 and worked at The Pennsylvania State University, Applied Research Laboratory, University Park, PA, where he focused on corrosion protection of naval ordnance, a project sponsored by the U.S. Navy. During that time, he completed the requirements for a doctorate in metallurgy under the guidance of Emeritus Professor Harold J. Read, the 1965 recipient of the AESF Scientific Achievement Award.

Di Bari's doctoral dissertation was on the corrosion of aluminum in sea water. A paper based on that work won an award from the National Association of Corrosion Engineers (NACE) for the best first paper published in *Corrosion* magazine.

He rejoined Inco in 1971 as a member of Product Development, where he planned and coordinated surface finishing research and development activities. In recent years, he has provided technical support to Inco marketing units throughout the world, including the presentation of lectures on nickel electroplating, electroforming and nickel anode materials. He writes *Nickel Currents*, an international newsletter on nickel plating that is published by Inco Limited.

Here's what he had to say during a recent interview with *P&SF* staff.

P&SF: How did it feel when you learned you were the 1998 Scientific Achievement Award winner?

GAD: Jack Dini nominated me three years ago. At first, I was reluctant to have my name placed in nomination because I'm really not in the same league as Wesley (1962), Brown (1967), Knapp (1977), DuRose (1969), Edwards (1980) and other award winners I've known. When I heard the news in Minneapolis, my knees began to shake. It was a thrill—a special moment.

P&SF: Why do you think you won?

GAD: Luck, plus good people in my life who gave me sound advice. I did my undergraduate work in chemistry at Brooklyn College. The school was tuition-free, admission was based on high school grade averages, and it had a reputation for academic excellence. Without that bit of luck, I would not have been able to go to college.

Then, about a year and a half after we were married, my wife, Claire, said, "Instead of sitting around on the couch watching TV, why don't you go get another degree?" So I enrolled at the New York Polytechnic Institute of Technology and got a master's degree in chemistry. For my thesis work, I tried to develop an ion-specific electrode that would measure the concentration of nickel in a plating solution as easily as measuring pH, but the approach we were testing was not successful. Then there was Dr. Joseph Petrocelli. He was the head of the electroplating section at Inco's Research Laboratory in Bayonne, NJ. He and Dr. Wesley, the head of the laboratory, hired me. Petrocelli taught me electrochemistry every Friday morning, and kept urging me to get a doctorate. He was my idea of a good manager, because he was genuinely interested in my future. Then a friend, Bill Nystrom, gave my name to a headhunter, and I landed the job at Penn State. One of the fringe benefits of that job was the opportunity to study for a doctorate with Harold Read, a great teacher and an expert in electroplating. Good people and good advice—that's why I won.

P&SF: Yes, but what were your accomplishments? Why do you think the committee decided you deserved the award?

GAD: That's a hard question to answer without sounding immodest, but as someone said ... *If I were humble, I would be perfect.* Some people would consider the work on the anodic behavior of nickel an accomplishment because of the

commercial consequences. This work started as a study of the electrochemical behavior of nickel in electroplating. It established that pure nickel is not only passive in chloride-free nickel plating solutions, but also in solutions containing chlorides. That led to a search for additives that would eliminate passivity and the discovery of the activating effect of sulfur in electrolytic nickel. Inco's decision to market a sulfur-containing electrolytic nickel anode material in 1962 was prompted by the company's desire to provide a special product for use with titanium anode baskets. Baskets were new and growing in popularity at the time. By 1966, the demand for plating nickel threatened to exceed Inco's capacity to shear electrolytic nickel into squares, and we began to develop a form of primary nickel that could be produced without shearing, in a form that would be ideal for use in baskets. Burt Knapp, Frank Carlin and I began the work, but eventually most of the people in the plating section became involved. That led to the marketing of sulfur-containing nickel in round (and spherical) forms in 1972—products that are still popular today, especially for electroforming. When I returned to Inco from Penn State, I reactivated research on a sulfur-free electrolytic product, and that eventually led to a button-shaped product *without sulfur* that is now the most widely used nickel anode material in the world. Billions of pounds have been sold since 1962, and I guess that's important.

My personal favorite, however, is the work I described in a paper presented at the *First AESF Decorative Plating Seminar,* Dearborn, MI, in 1973. That paper (co-authored with Al Dill and Burt Knapp) correlated the electrochemical characteristics of bright and semi-bright nickel coatings deposited from various proprietary processes with outdoor corrosion performance data. The work demonstrated that the differences in performance of the proprietary systems resulted from small differences in the electrochemical potential difference between semi-bright and bright nickel layers. The paper recommended that the difference in potential be 120 millivolts or greater to obtain best performance, particularly in low-current-density areas of plated components.

I like to believe that this work and related studies by several other investigators inspired Harbulak to develop the STEP test. By the way, that was another exciting day. I visited the Chrysler laboratory in Detroit, and Harbulak explained the principle of the test to me before he published his paper in 1980. The STEP test is now used every day to control the quality of decorative nickel plus chromium coatings, and Harbulak's contribution is an important one.

P&SF: Why is that your favorite piece of work?

GAD: The development of proprietary nickel anode materials was important for Inco and for nickel electroplaters. Sulfur-containing electrolytic nickel cuts power costs, primary nickel is the lowest cost form of the metal for plating, and the round shape has other practical benefits. The work on the corrosion performance of decorative nickel-plus-chromium coatings, however, was beneficial for the entire metal finishing industry. The paper that I co-wrote with Frank Carlin on corrosion performance of decorative nickel-chromium coatings on steel was similar in spirit, in that it proved that decorative nickel-plus-chromium coatings are capable of protecting steel from corrosion for more than 15 years in severe outdoor marine atmospheres. That type of work helps create new markets for electroplating. Without new markets … new applications … there would be no demand for nickel anode materials.

P&SF: You've also been an active member of AESF and other professional societies. Has that been worthwhile, and why?

GAD: It's been worthwhile in many ways. Volunteering is good for the soul. For many years, I attended AESF conferences and Fall meetings of the Electrochemical Society and sat through as many presentations as I could. That's how I learned. But I did not really become active in AESF until the mid-1970s, when I became

chairman of the Research Board. That was when the U.S. EPA began supporting research on pollution control and prevention. We had a large research budget then—close to $200,000 a year, if I remember correctly. Perhaps that paved the way for the close relations we have with EPA today.

I was also on the AESF Scholarship Committee when that worthwhile program was conceived. More recently, I have been chairman of the Electroforming Committee and, with the help of Ron Parkinson (NIDI) and other members of the committee, we have been presenting an electroforming course that has been well received. We plan to give the course again during AESF Week in Orlando, January 28–29. Many members of the Electrochemical Society are involved in preparing a new edition of *Modern Electroplating*, and in 1997, 1 wrote two chapters—one on nickel plating and the other on nickel and cobalt alloy plating. It was hard work, but I was pleased with the results. The new book should be published next year.

I am also a member of the Institute of Metal Finishing and was made a Fellow of the Institute in 1992. I've been a member of ASTM Committee B 8 since 1972, and a delegate to ISO Technical Committee 107 meetings since 1980. Those committees write national and international metal finishing standards. ASTM Committee B 8 gave me the Frederick A. Lowenheim Award in 1987, which was another big thrill, because I knew and respected Fred.

P&SF: Someone told me you are about to retire from Inco? Is that true?

GAD: I've been with Inco for 37 years and it's time to go. The company has been extremely good to me. The last ten years have been unbelievably busy and exciting. I have traveled widely and now have friends in the metal finishing industry all over the world.

P&SF: Any plans for the future?

GAD: Inco has retained me as a consultant for a year, so that'll keep me busy. I expect to continue to teach the NiDI/AESF Electroforming Course on a voluntary basis. I became secretary of ISO Technical Committee 107 after Allen Grobin, the former secretary, passed away in March, and I'll continue to volunteer my services, because developing standards of excellence helps the metal finishing industry grow and prosper. Many of the members of this Society probably don't know that AESF has been providing financial support and is responsible for administering the Secretariat of ISO TC 107. The AESF Board of Directors endorsed my appointment as secretary at their recent meeting in Minneapolis. I am grateful for that. At ISO meetings, AESF members represent the U.S. metal finishing industry and endeavor to develop standards that foster free trade. Of course, I'll continue to write *Nickel Currents. That's* something I really enjoy.

P&SF: What do you think you'll talk about next year?

GAD: How about *Scientific Achievement Winners I Have Known*? I've known some of the best. P&SF