Corrosion of Electronic and Magnetic Materials

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Foreword

This publication, *Corrosion of Electronic and Magnetic Materials,* contains papers presented at the symposium of the same name held in San Francisco, California on 22 May 1990. The symposium was sponsored by ASTM Committee G-1 on Corrosion of Metals. Phillip J. Peterson, IBM Corporation, San Jose, California, presided as symposium chairman.

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Overview

Modern civilization has an insatiable appetite for ever faster and improved communication plus a never-ending desire to store, retrieve, and manipulate information no matter where we are, whether in our offices, stuck in a traffic jam on the freeway, or sunning ourselves on the beach. This desire and appetite has driven the use of electronic and magnetic materials to dimensions that are rapidly approaching atomic units, to include exotic materials for which little if any corrosion experience exists, and to survive hostile environments. Through global competition, these products must be produced at decreasing costs, increasing reliability, and decreasing development time.

The shrinking size of our electronic and magnetic devices have forced us to take a closer look at corrosion. We must extend our limits for what we call corrosion. Is Pourbaix's 10^{-6} limit still valid? Is what we used to consider mild inconsequential tarnish now to be considered devastating corrosion? This new closer look at corrosion is reflected in the papers of Rickett and Payer, Goodson and Chang, and Hadad and Pizzo.

In the past, engineers have shied away from using materials they had no experience with or for which they could not find corrosion data. At present and especially in the future, we cannot afford to do this and stay competitive. We must either produce our own corrosion data and/ or encourage and facilitate publication of corrosion studies of new materials such as those by Kim and Camp; DeBold, Masteller, Werley, and Carpenter; and Lee and Stevenson.

Computer power that only a few years ago was found exclusively in clean, air-conditioned rooms that would rival medical operation rooms can now be found on laps by the seashore. Telephones now have such scanty protective covers that even Superman is taken back. Today we carry on our wrists through rain, snow, swimming pools, and saunas sophisticated electronic devices that would make Dick Tracy envious. And yet, thanks to global competition, many of these devices are so cheap we would rather discard them than replace their batteries. In the past, sophisticated electronic and magnetic materials were protected in hermetically sealed packages, a costly overprotection for most applications but requiring little knowledge of either the environment or its corrosive effects on these materials. But now, to be cost competitive, we must carefully define what is just-sufficient-protection for our products to survive the environment in which they are to be used. It is work like that of Schubert, Sproles, Setchell, and Yee and Bradford that enable cost competitiveness to be achieved without sacrificing product reliability.

To ensure the reliability of products with new materials or even old materials with new packaging, environmental exposure tests are required. From the pressures of competitive time development, it is desirable for many of these exposure tests to be accelerated and their results made available at the time the new product is introduced in the marketplace. To do this, preagreed upon tests accepted by vendors, manufacturers, and customers must be in place. It is here where ASTM will play an important role in the development of new electronic and magnetic materials.

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