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Dr. Abner Brenner

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Dr. Abner Brenner

D. R. Gabe

Like many Americans of his generation Abner Brenner came from a European Jewish Immigrant family although he himself was born in Kansas City, Missouri on 5 August 1908. He was educated at the Universities of Missouri, Wisconsin and Maryland taking his PhD from Maryland in 1930. That year he joined the National Bureau of Standards in Washington and without a break continued until his retirement in 1971. He married Sonia Persky in 1936 and after her death in 1964 he married Marcella Siegel Bernstein so on his death in 1999 (13 August) at the age of 91 he had celebrated two silver wedding anniversaries. He had four sons, ten grandchildren and one great grandchild. His second wife was a loyal supporter of Zionist cultural organizations notably the Bezalel Academy of Arts & Design.

When Brenner joined the NBS in 1930 it was probably the leading research centre for electroplating research in the USA largely as a result of the drive and leadership of Dr William Blum. It is not by chance that the American Electroplaters Society has named its two leading research-publication awards after Blum and Brenner. His time there has been described in many ways but the adjectives generous, supportive, helpful, thoughtful, humorous and respected have been used. He was eventually the author of over 100 papers and 30 patents but these do not represent his true output, much of which was necessarily in confidential government reports. Furthermore, much was never fully published but can be found as asides in his other papers. This is especially true for his *magnum opus* – the two volume treatise on Alloy Electrodeposition which was published in 1963[1]. It came out of his huge personal card file indexes which recorded over many years the vast expansion in this field of knowledge. But it also contains gems of personal unpublished research which are groundbreaking when looked at from this distance. Two examples are:

1. The production of multilayered deposits by current pulsing in alloy plating solutions, his example being Cu-Bi alloys attributed to himself and Pommer (vol. 2 p589).

2. The measurement of diffusion layer thicknesses especially using a hollow cathode into which liquid nitrogen or a solid CO_2/alcohol slurry might be placed to freeze the diffusion layer. It could then be micro-sliced (microtomed) and analysed slice by slice using chemical microanalysis. (vol.1 p295).

How he managed to collate and write this book has always been a mystery but his wife did give a clue in describing his habits, after his death:

"He habitually rose early and worked at least as long as there was daylight".

By the 1940s it is clear that he was the group leader, leading his own team from which distinctively original work can be identified. In 1946 he reported[2] the principles of 'Nickel Plating on Steel by Chemical Reduction' which was described as one of the most significant discoveries in the history of surface finishing when it was reprinted by the AESF in 1998. Now known as *Electroless Deposition* (or Autocatalytic Deposition) it was described by Brenner as an accidental discovery and in his modest way he showed the origins of the idea to be work published in 1845 and 1911 but nevertheless took out a patent to 'protect US government rights'. In 1984 he wrote an interesting reminiscent article describing this discovery in more detail[3].

Brenner's conclusion was that the process would be 'too expensive to operate widely except for some special applications for small steel parts and the inside of hollow articles'. Within ten years it was being adapted for plating plastics, which saw a rapid commercialisation. Within another ten years the impurities in electroless nickel, especially phosphorus arising from the breakdown of the hypophosphite solution reductant, were being exploited as a classical age-hardening heat treatment process to double the hardness and wear resistance of nickel deposits for engineering applications.

Within two years his researches on magnetic properties of deposits had led to both magnetic and eddy-current thickness measuring gauges to become convenient commercial measuring techniques. At the same time he was responding to the post-war recognition of internal stress in electrodeposits as being a seriously limiting property to support researches by Seymour Senderoff leading to invention of the Spiral Contractometer[4] as a much more sensitive measuring instrument than was hitherto available and which could be used as a continuous measuring device to indicate *instantaneous* stress.. This instrument has long been available commercially and DIY construction guidelines made available. Its use, however, has been disappointingly small largely because it is essentially a research tool and not very user-friendly to practical electroplaters. For researchers, their detailed mathematical analysis of the nature of internal stress has long been a starting point for new inventions[5].

After his retirement in 1971 he set up a consulting laboratory where he continued basic research especially the characteristics of non-aqueous solutions working on what was at the time known as electropainting. His last patents taken out in 1998 just before his death related to acrylic paint coatings.

Brenner's influence was substantial and as a senior government scientist he sat on many influential committees always encouraging and supporting where possible. He was active also in technical societies who recognised his role with many honours.

1961 Hothersall Medal of the Institute of Metal Finishing
1961 Scientific Achievement Award and Blum lecturer of the AESF
1974 Electrochemical Society De Nora Engineering and Technology award.

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