The 43rd William Blum Lecture
Presented at the 89th AESF Annual Convention (SUR/FIN 2002)
in Chicago, Illinois
June 24, 2002

Hydrogen Embrittlement of High Strength Steel: The Russian Approach

by
Vladimir N. Kudryavtsev
Recipient of the 2001 William Blum
AESF Scientific Achievement Award

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Editor's Note: This article is a summary of the 43rd William Blum Lecture, presented at the 89th AESF Annual Convention (SUR/FIN 2002) in Chicago, Illinois on June 24, 2002. A full paper was not made available, but the summary to follow was provided prior to the conference.

SUMMARY

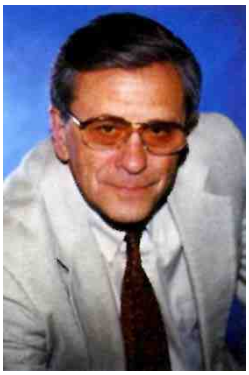
Usually, mechanical tests are required in studies of hydrogen embrittlement of steel. A new method has been developed that separately measures the hydrogen absorbed in the steel and in the coating. With this method, three sources of hydrogen absorption by the steel have been found: (1) at bare areas of the steel; (2) at the coating surface and (3) during plating.

In this work, hydrogen absorption has been examined on several coatings, including cadmium, cadmium-titanium, zinc, zinc-titanium and chromium. The hydrogen distribution was studied in these systems in terms of how it gets there and how it can be relieved at elevated temperatures. Proposed mechanisms and their practical implications are also presented.

About the author:

This material was written at the time Dr. Kudryavtsev was announced as the recipient of the 2001 Scientific Achievement Award.

The AESF Scientific Achievement Award is the Society's most prestigious award. Its purpose is to recognize those whose outstanding scientific contributions have advanced the theory and practice of electroplating, metal finishing and allied arts; have raised the quality of products and processes; or have advanced the dignity and status of the profession.



Dr. Sc. Vladimir N. Kudryavtsev of Mendeleyev University of Chemical Technology, Moscow, Russia, was selected as the recipient of the award for 2001. The announcement was made at SUR/FIN 2001 in Nashville, Tennesse.

In a letter to AESF's Awards Board nominating Prof. Kudryavtsev, Steve Schachameyer stated that, in addition to the professor's numerous technical works, he should also "be recognized for his additional contribution to the whole of our industry through his creation of an AESF equivalent that now exists in Russia. Conferences and regionals are held, along with exhibits.
He also began and personally sponsored the new Russian society journal, Electroplating and Surface Treatments, modeled after our Plating and Surface Finishing. He is truly a leader in our global industry as demonstrated by his efforts."

Prof. Kudryavtsev graduated from Mendeleyev Institute of Chemical Technology in 1958. Since 1986, he has been head of the Electrochemical Engineering Department at Mendeleyev Institute, and head of the Electrodeposition of Metals laboratory at the Institute of Physical Chemistry, Russian Academy of Sciences. He has published more than 200 scientific papers, and holds 30 patents. He has had 44 papers published in foreign journals and proceedings of international conferences.

Prof. Kudryavtsev is a member of the Academy of Natural Science of the Russian Federation; chairman, Electrochemistry and Surface Treatment branch of the All Russian Chemical Society; president, Russian Society of Surface Technology and Corrosion; and founder, publisher and editor-in-chief of the Russian journal, Electroplating and Surface Treatments. He is also a member of several editorial boards, and has been organizer/ chairman of the All Russian (international and domestic) conferences and seminars.

For more than 10 years, Prof. Kudryavtsev has faithfully presented his latest work at AESF conferences and workshops. He also serves on AESF's Hard Chromium Committee. In addition to being an active member of the AESF, Prof. Kudryavtsev is a member of the International Society of Electrochemistry (ISE) and the European Academy of Surface Technology (EAST).