

Proposed AVS Abstract

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**Boron and Boron-Based Coatings as Produced by Vacuum Arc Technology.** C.C. Klepper, R.C. Hazelton, E.J. Yadlowsky, E.P. Carlson, M.D. Keitz, HY-Tech Research Corporation, Radford, VA, 24141 and J. M. Williams, Oak Ridge National Laboratory, Oak Ridge, TN, 37831.

In principle, boron as a material has many excellent surface properties, including corrosion resistance, very high hardness, refractory properties, and a strong tendency to bond with most substrates. However, the potential technological benefits of the material have not been realizable because of difficulty in synthesis of coatings. Boron is difficult to evaporate, does not sputter well and cannot be thermally sprayed. In the present program, a robust system, based on the vacuum (cathodic) arc technology, for generation and delivery of boron plasmas to substrates has been developed. The system produces a fully ionized B plasma, which allows use of substrate bias to control the energetics of deposition. Films and coatings have been produced on 1100 Al, CP-Ti, Ti-6Al-4V, 316 SS, hard chrome plate, 52100 steel and other materials. Analyses have been performed by Rutherford backscattering spectrometry. Properties are being evaluated by nanoindentation hardness and other techniques. First results are that the coatings are smooth, highly adherent, and pore free. A number of applications are contemplated.

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Research sponsored in part by the National Science Foundation under contract # DMI-0078385 with HY-Tech Research Corporation. Research at Oak Ridge National Laboratory is sponsored by the U. S. Department of Energy under contract # DE-AC05-00OR22725 with UT-Battelle, LLC.

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