LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

UCRL-PROC-228732

Industrial Environmental Testing of Coupons and Prototype Cylinders Coated With Iron-Based Amorphous Alloys

R. B. Rebak, L. F. Aprigliano, S. D. Day, T. Lian, J. C. Farmer

March 6, 2007

Materials Science and Technology 2007 (MS&T'07)
Detroit, MI, United States
September 16, 2007 through September 20, 2007

Disclaimer

Abstract prepared for presentation in the symposium "Iron-Based Amorphous Metals: An Important Family of High-Performance Corrosion-Resistant Materials" at the Materials Science and Technology 2007 (MS&T'07) Conference and Exhibition in Detroit, MI, at the COBO Center on 16-20 September 2007

Industrial Environmental Testing of Coupons and Prototype Cylinders Coated With Iron-Based Amorphous Alloys

Raul B. Rebak
Louis F. Aprigliano[1]
S. Daniel Day
Tiangan Lian
Joseph C. Farmer

Lawrence Livermore National Laboratory, Livermore, CA 94550
[1]Consultant

Iron-based amorphous alloys are desirable for many industrial applications due to their dual capacity to resist corrosion and wear. These alloys may also contain a significant amount of boron which makes them candidates for criticality control, for example, in high-level nuclear waste disposition applications. The Fe-based amorphous alloys can be produced in powder form and then deposited using a HVOF thermal spray process on any surface that needs to be protected. For the current testing coupons of 316L stainless steels were coated with the amorphous alloy SAM2X5 and then tested for corrosion resistance in the salt-fog chamber and in other industrial environments. Prototype cylinders were also prepared and environmentally tested. One cylinder was 30-inch diameter, 88-inch long, and 3/8-inch thick. The coating thickness was 0.015 to 0.019-inch thick. The cylinder was in good condition after the test. Along the body of the cylinder only two pinpoint spot sized signs of rust were seen. Test results will be compared with the behavior of witness materials under the same tested conditions.

ACKNOWLEDGMENTS

This work was performed under the auspices of the U.S. DOE by the University of California Lawrence Livermore National Laboratory (LLNL) under Contract No. W-7405-Eng-48. Work was sponsored by the United States Department of Energy (DOE), Office of Civilian and Radioactive Waste Management (OCRWM); and Defense Advanced Research Projects Agency (DARPA), Defense Science Office (DSO). The guidance of Leo Christodoulou at DARPA DSO and of Jeffrey Walker at DOE OCRWM is gratefully acknowledged.