

Electron-beam deposition of a thin-film magneto-dielectric iron and alumina based coating by a fore-vacuum plasma electron source

D. B. Zolotukhin¹, A. V. Tyunkov¹, V. P. Frolova^{1,2} and Yu. G. Yushkov^{1,2}

¹ Tomsk State University of Control Systems and Radioelectronics
40 Lenin Ave., Tomsk, 634050, Russia
E-mail: ZolotukhinDen@gmail.com

² Institute of High Current Electronics SB RAS
2/3 Akademichesky Ave., Tomsk, 634055, Russia

Received 26.09.2022; revised 17.10.2022; accepted 31.10.2022

The results of an experiment on a thin-film magneto-dielectric coating deposition under successive electron-beam radiation in helium and oxygen at a fore-vacuum pressure (5 Pa) of samples made of steel and alumina ceramics are described. The presence of a coating of magnetic properties was demonstrated by the method of ferromagnetic resonance, the X-ray study confirmed the presence of a coating of Fe₃O₄ magnetic oxide, and the coatings measured by an optical profilometer were 3–6 μm.

Keywords: magneto-dielectric coatings, fore-vacuum plasma electron sources, beam plasma.

DOI: 10.51368/1996-0948-2023-1-61-65

REFERENCES

1. Hasan M., Shafi M. N., Siddiquy M. N., Rahim M. A. and Islam M., Journal of Scientific Research **8** (1), 21–28 (2016).
2. Tamarin Y. Protective Coatings for Turbine Blades, ASM International, 2002.
3. Lyado N. M., Bazarov V. V., Vagizov F. G., Vakhitov I. R., Dulov E. N., Kashapov R. N., Noskov A. I., Khaibullin R. I., Shustov V. A. and Faizrakhmanov I. A., Applied Surface Science **378**, 114–119 (2016).
4. Sikola T., Spousta J., Dittrichova L., Stransky M., Zlamal J., Matejka F., Nebojsa A., Zemek J., Perina V., Rafaja D. and Ranno L., Nuclear Instruments and Methods in Physics Research B **148**, 907–911 (1999).
5. Riedel R. and Chen I. W., Ceramic Science and Technology, New York, John Wiley & Sons, 2011.
6. Burdovitsin V. A., Klimov A. S. and Oks E. M., Technical Physics Letters **35**, 511–513 (2009).
7. Li W.-Q., Mu K. and Xia R.-H., Micron **42** (5), 443–448 (2011).
8. Zolotukhin D. B., Tyunkov A. V., Yushkov Yu. G. and Zhuravlev V. A., Ceramics International **47**, 34704–34711 (2021).
9. See website <https://truststal.by/stati/55-stal-st3-khimicheskij-sostav-i-svoystva.html> (available at 31.10.2022).