PACS: 68.90.+g, 43.80.-n

Inactivation of microorganisms on metal surfaces protected by a thin layer of titanium oxide

V. Ya. Pecherkin[1], E. A. Deshevaya[2], L. M. Vasilyak[1], S. L. Vasilyak[3], A. M. Fatyushin[3], C. V. Fialkina[2] and Q. C. Hoang[4]

[1] Joint Institute for High Temperatures of Russian Academy of Sciences
Bd. 2, 13 Izhorskaya st., Moscow, 125412, Russia
E-mail: vpecherkin@yandex.ru

[2] Institute of Biomedical Problems of Russian Academy of Sciences
76a Khoroshevskoye shosse, 123007, Russia

[3] Joint-stock company Special Design Engineering Bureau in Electrochemistry with Experimental Factory
12 Selskokhozyaystvennaya st., Moscow, 129226, Russia

[4] Joint Vietnam-Russia Tropical Science and Technology Research Center, Department of Biotechnology
63 Nguyen Van Huyen, Nghia Do, Cau Giay, Hanoi, Vietnam

Received November 07, 2022

Tests of a protective thin-layer coating of metal surfaces created with titanium oxide against the development of mold fungi were carried out in laboratory conditions. As a result of studies for 28 days, 100 % inactivation of micromycetes on the protected surface of metal samples was shown under conditions favorable for the growth of fungi when modeling mineral and organic pollution.

Keywords: titanium oxide, anatase, mold fungi, protection of metal surfaces.

DOI: 10.51368/1996-0948-2022-6-56-62

REFERENCES

1. H. J. Hueck, International Biodeterioration & Biodegradation **48**, 5 (2001).
2. R. H. Gaines, J. Ind. Eng. Chem. **2**, 128 (1910).
3. J. H. Garrett, *The action of water on lead*. (UK, London, H. K. Lewis, 1891).
4. B. J. Little and J. S. Lee, Int. Mater. Rev. **59** (7), 384 (2014).
5. Yang Dazhang, Liu Jianhua, E. Xiaoxue and Jiang Linlin, Annals of Nuclear Energy **94**, 767 (2016).
6. B. J. Little and J. S. Lee, *Microbiologically Influenced Corrosion*. (USA, New Jersey, John Wiley & Sons Inc. Hoboken, 2007).
7. J. Telegdi, A. Shaban and L. Trif, International Journal of Corrosion and Scale Inhibition **9** (1), 1 (2020).
8. P. R. Roberge, *Handbook of corrosion engineering*. (USA, New York, McGraw-Hill Education, 2019).
9. A. Yu. Lugauskas, A. I. Mikulskene and D. Yu. Shlyauzhene, *Catalog of micromycetes – biodestructors of polymer materials*. (Nauka, Moscow, 1987).

10. S. K. Zhigletsova, V. B. Rodin and V. S. Kobelev, Applied biochemistry and microbiology **36** (6), 637 (2000).
11. V. A. Chugunov, I. I. Martovetskaya and R. I. Mironova, Applied biochemistry and microbiology **36** (6), 631 (2000).
12. D. Allsopp, K. J. Seal and C. C. Gaylarde, *Introduction to Biodeterioration*. (UK, Cambridge, Cambridge University Press, 2004).
13. E. A. Deshevaya, N. D. Novikova, E. V. Dolgova, M. G. D'yakova and V. A. Tverskoi, Polymer Science. Series A **61** (4), 475 (2019).
14. E. A. Deshevaya, M. V. Gusarov and V. A. Tverskoy, Aerospace and environmental medicine **56** (3), 54 (2022).
15. Muhammad Zaffar Hashmi, Shuhong Wang and Zulkfil Ahmed, *Environmental Micropollutants*. (Netherlands, Amsterdam, Elsevier, 2022).
16. L. M. Vasilyak, Plasma Phys. Rep. **47**, 318 (2021).
17. V. A. Panov, L. M. Vasilyak, S. P. Vetchinin, E. A. Deshevaya, V. Y. Pecherkin and E. E. Son, Plasma Physics Reports **45** (5), 517 (2019).
18. A. Fujishima, K. Hashimoto and T. Watanabe, *TiO_2 Photocatalysis Fundaments and Applications*. (Japan, Tokyo, Published by BKC. Inc., 1999).
19. GOST 9.049-91, Polymer materials and their components. Methods of laboratory tests for resistance to the effects of mold fungi.