NOVEL ANTIMICROBIAL SURFACES BASED ON $CuO\text{-}Cu_2O/TiO_2$ NANOPARTICLES

Dmytro Danilian[1], Meeri Visnapuu[1], Angela Ivask[2], Rainer Pärna[1], Vambola Kisand[1]

[1]*Institute of Physics, University of Tartu, W.Ostwaldi 1, 50411 Tartu, Estonia*
[2]*Institute of Molecular and Cell Biology, University of Tartu, Riia 23, 51010 Tartu, Estonia*

e-mail of presenting author: dmytro.danilian@ut.ee

Antimicrobial touch surfaces have been implemented in healthcare settings to supplement current hygiene standards and aid in the problem against the growing threat of antimicrobial resistance. In this work, starting from Evonik (Degussa) P25 TiO_2 nanoparticles we prepared $CuO\text{-}Cu_2O/TiO_2$ nanoparticles by impregnation method [1] (with initial 2, 4, 8 wt.% copper concentration) for further investigation against gram-negative, gram-positive bacteria models and a fungal model.

Characterization of the surface coating was performed using XPS, UV-Vis, SEM and TEM techniques. XPS confirmed the presence of Cu in its two different oxide forms and allowed to monitor the ratio of these two oxides. No metallic copper was observable on the surface of prepared samples. We also investigated the influence of pH value (from 6.5 to 9.5) on impregnation process. The XPS analysis demonstrated, that higher pH value during impregnation caused higher Cu 2p / Ti 2p photoelectron peak ratio, i.e. higher amount of copper compounds on TiO_2 surface. It shows that higher pH value during impregnation caused more efficient copper deposition on the surface of TiO_2 nanoparticles. Also, evaluation of the photocatalytic activity of $CuO\text{-}Cu_2O/TiO_2$ suspensions was performed by the degradation rate of methylene blue under UV-light irradiation (UVA, 2.8 W/m^2).

References

1. A. Ajmal *et al.* Journal of Environmental Chemical Engineering 4 (2016) 2138–2146

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