

STRESZCZENIE W JĘZYKU ANGIELSKIM

A study on the functionalization of cotton and viscose fabrics to achieve multifunctional conductive, antibacterial, UV protection and photocatalytic properties was carried out. For the functional modification of textile materials the silver nanowires (AgNWs) colloid and titanium dioxide (TiO₂) sol prepared in sol-gel technique were used.

Due to low thermal resistance of both cellulose fabrics, the new microwave treatment as a method to change amorphous form of TiO₂ to anatase form was applied. The photocatalytic activity of the fabrics was evaluated by decomposition of nicotine using new method developed on the basis of infrared spectroscopy as well as the gas chromatography as a compared technique. For the first time hybrid functionalization of cellulose fabrics by AgNWs/TiO₂ coating was carried out.

As a result of the study, a detailed characterization of modifiers and effects of cellulose fabrics modification using measurement techniques: UV-VIS spectroscopy, SEM and STEM microscopy, X-ray diffraction, thermogravimetry TGA, Raman spectroscopy, analysis of wettability and surface free energy were achieved.

The AgNWs/TiO₂ modification caused 3 and 4 times (cotton fabric) and 1.8 and 1.5 (viscose fabric) faster decomposition of nicotine under respectively UV and VIS light than for unmodified fabrics. The AgNWs/TiO₂ modified cotton fabric showed the surface resistance of $1.5 \times 10^3 \Omega$ and antibacterial activity against *Staphylococcus aureus* and *Klebsiella pneumoniae* bacteria. The obtained results showed that the same modification method gives various effects for cotton and viscose fabrics. The viscose fabric is much more sensitive to the applied modifications compared to the cotton fabric. The mechanical properties of the viscose fabric deteriorate after each step of the applied modification: plasma machining, microwave treatment, AgNWs and AgNWs/TiO₂ modifications. The study demonstrate that AgNWs/TiO₂ modified fabrics have bioactive properties against bacteria and can be used as conductive (cotton fabric), air purifying and UV protective materials (cotton and viscose fabric).