

Antibacterial Modification Of Polyethylene By Multistage Process Utilizing Low-temperature Plasma

[10.5339/qfarc.2014.HBPP0279](https://doi.org/10.5339/qfarc.2014.HBPP0279)

Anton Popelka, Ph.d.; Igor Novák; Marián Lebocký; Igor Krupa

CORRESPONDING AUTHOR :

anton.popelka@qu.edu.qa

Qatar University, Doha, Qatar

Abstract

Limiting factor of PE application in healthcare is high susceptibility of polyethylene towards bacterial growth. For this reason, antibacterial treatment of PE foils using appropriate antibacterial agents was used in this work. Benzalkonium chloride and bronopol were selected due to their satisfactory antibacterial effect confirmed by applications in medical and cosmetic industry. These antibacterial agents were immobilized onto PE surface by a multistage approach via polyacrylic acid brushes grafting onto the PE surface pre-treated by low-temperature plasma. Measurements of surface energy, X-ray Photoelectron Spectroscopy (XPS), Fourier Transform Infrared Spectroscopy with Attenuated Total Reflectance (FTIR-ATR), Scanning Electron Microscopy (SEM), and Atomic Force Microscopy (AFM) were used for investigation of surface changes after antibacterial modification of PE. Moreover, the antibacterial effect was evaluated by inhibition zone measurements of *Staphylococcus aureus* and *Escherichia coli* bacterial strains.