

“Click”-Based LbL Self-assembled Films for Selective Bacteria Detection

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Identifying bacterial contamination in the food industry or on medical instruments is an important issue in public safety. Developing rapid, sensitive, selective, convenient and low cost methods to detect bacteria has thus attracted widespread attention. The use of strain-promoted 1,3-dipolar cycloaddition of cyclooctynes with azides for surface functionalization and its application in bacteria detection are described. In this study, highly water-soluble poly(AA(acrylic acid)-co-APEG(poly(ethylene glycol) methyl ether acrylate)) copolymers that contain 4-dibenzocycloocynol (DIBO) terminal chain transfer agent (named DIBO-PC-) have been successfully synthesized by reversible addition-fragmentation chain transfer polymerization (RAFT). Self-assembled layer-by-layer (LbL) films were prepared by alternatively depositing two oppositely charged PCs on glass by means of electrostatic attraction and DIBO-PC- acted as the last layer. And then both of azido fluorescein and azide-containing anti-*E. coli* antibody were introduced on the DIBO-PC- film via 1,2,3-triazole formation under metal-free conditions to give a fluorescent and selective surface. Besides, the photophysical and surface properties of the functionalized LbL films were characterized by steady-state UV-vis and fluorescence spectroscopy, AFM, confocal intensity and fluorescence lifetime imaging microscopy (FLIM). *E. coli* bacteria could be monitored using LbL films effectively.

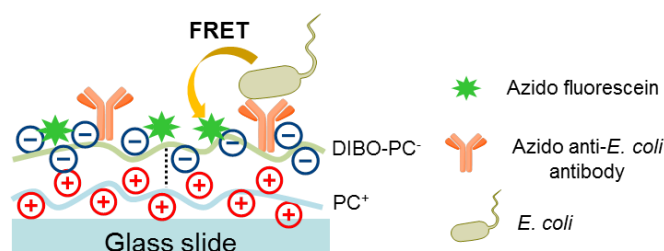


Figure 1. Schematic illustration of the fluorescent and selective surface for special bacteria detection

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References:

- [1] Y. Si, C. Gazon, G. Clavier, J. Rieger, J. Audibert, B. Sclavi, R. Méallet-Renault. *Biosensors and Bioelectronics*. **2016**, 75, 320
- [2] R. Costa, J. Mano, *Chem. Soc. Rev.* **2014**, 43, 3453
- [3] N. Boens, V. Leen, W. Dehaen, *Chem. Soc. Rev.* **2012**, 41, 1130
- [4] P. A. Ledin, N. Kolishetti, M. S. Hudlikar and G. J. Boons, *Chem. Eur. J.* **2014**, 20, 8753