Abstract

This project is concerned with the preparation of electrospun polystyrene (PS) nanofiber materials with covalently bonded NO-photodonor and electrostatically attached tetracationic porphyrinoid photosensitizers. These photofunctional nanofiber materials exhibit effective simultaneous photogeneration of small antibacterial NO and $O_2(^1\Delta_g)$ species under irradiation with daylight creating an antibacterial surface and near surrounding. NO species can be also generated just by gentle heating. Nanofiber materials were analyzed with SEM, FTIR, emission and UV/vis spectroscopy and time-resolved emission and absorption spetroscopy. The antibacterial effect was tested on *Escherichia coli*. The dual antibacterial action, in combination with the nanoporous character of the material that detains pathogens like bacteria on its surface, is ideal for any application where a sterile environment is necessary.

The known bimetallic cluster system $[(PMe_2Ph)_4Pt_2B_{10}H_{10}]$ that possesses the propensity to reversibly bind small gaseous molecules (O_2, SO_2, CO) was synthesized in good yields for NO reversible binding investigation. Seven new monometallic precursors (Pt, Pd and Ni) to new bimetallic species were succesfully synthesized with the aim of future study of NO reversible binding. All new compounds were purified by chromotographic methods and characterized by multinuclear NMR spectroscopy and single-crystal X-ray diffraction analysis.

Subject headings: photochemistry, photophysics, photocytotoxicity

Keywords: boranes, singlet oxygen, nitric oxide, nanofibers