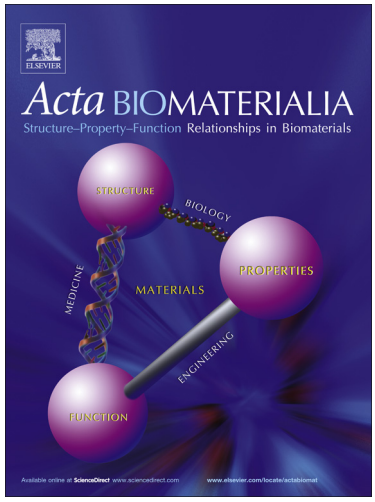

Full length article

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Plant-inspired gallolamine catalytic surface chemistry for engineering an efficient nitric oxide generating coating

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ABSTRACT

A novel concept of generating therapeutic gas, nitric oxide (NO) via catalytic phenolic-amine "gallolamine" surface chemistry is developed. The concept is realized using plant polyphenol, gallic acid, and a glutathione peroxidase-like organoselenium compound cystamine or selenocystamine through one-step phenol-amine molecular assembling process. The resulting NO-generating coating with phenolic-cystamine or -selenocystamine framework showed the ability for long-term, steady and controllable range of NO release rates being unparalleled with any existing NO-releasing or NO-generating surface engineering toolkits.

Developing a facile and versatile strategy for a NO-generating coating with long-term, stable and adjustable NO release is of great interest for the application of blood-contacting materials and devices. Covalent immobilization of glutathione peroxidase (GPx)-like compound to generate NO from a material surface by exposure of endogenously existed S-nitrothiol (RSNO) is a popular strategy. However, it is generally involved in multi-step and complicated processes. Moreover, the amount of immobilized GPx-like compounds is limited by the density of introduced reactive functional groups on a surface. Herein, we propose a novel concept of catalytic plant-inspired gallolamine surface chemistry for material-independent NO-generating coatings. The concept is realized using plant polyphenol, gallic acid, and a GPx-like organoselenium compound cystamine or selenocystamine through one-step