

Abstract

This study focused on developing a multifunctional bioactive hemostatic dressing that combines strong infection resistant with rapid blood clotting capability. The polyethylene terephthalate (PET) fabric was first subjected to plasma treatment to introduce functional groups, followed by in situ nanosilver immobilization to impart antimicrobial property. Nanosilver immobilized PET fabric then coated with the chitosan (CS), polyethylene oxide (PEO) and ϵ -amino caproic acid (ACA) blends containing different concentrations of ACA to impart hemostatic property to the dressing.

The resulting dressings exhibited a rapid ACA release and enhanced hydrophilicity with the increase of ACA promoting quick clot formation. The dressings demonstrated exceptional antimicrobial efficacy ($\geq 99\%$ kill rate), biocompatibility ($\geq 70\%$ cell viability), and remarkable hemostatic performance in vivo and in vitro, significantly reducing bleeding and clot formation within 30s. These results revealed that developed dressing provide an excellent and versatile solution for reducing severe blood loss and promoting wound healing by fast blood clotting, infection management, and safe application in emergency medical circumstances.