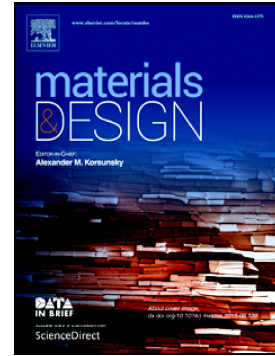


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Fabrication and evaluation of polydimethylsiloxane modified gelatin/silicone rubber asymmetric bilayer membrane with porous structure

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ABSTRACT: This work aims at developing an asymmetric bilayer membrane with porous structure via a simple and practical processing route. Herein, we first used epoxy-terminated polydimethylsiloxane to react with pristine gelatin (GE) to prepare modified gelatin. This polydimethylsiloxane modified gelatin (PGE) was then blended with silicone rubber (SR) precursor to fabricate PGE/SR composite membrane through a self-stratification strategy driven by surface tension gradients. It was found that flexible siloxane chains were covalently cross-linked onto gelatin molecules, and the PGE/SR membrane exhibited a typical asymmetric bilayer structure with multiscale pore structure. In particular, the sub-layer of PGE/SR membrane exhibited a hierarchical porous structure and the average pore sizes could be tuned by varying the crosslinking degree. Further studies demonstrated that PGE/SR exhibited appropriate mechanical properties, and the water uptake and water vapor permeability fell in the usual requirements of a conventional wound dressing. More importantly, the PGE/SR membrane showed appropriate biodegradability and non-cytotoxicity in vitro. These findings suggested that the PEG/SR membrane was beneficial to the wound healing, and promising as an alternative scaffold for skin regeneration. We further expect this methodology for construction of an asymmetric bilayer membrane with porous structure will shed light on the design of functional materials.

KEYWORDS: Polydimethylsiloxane modified gelatin; silicone rubber; asymmetric bilayer membrane; porous structure; wound dressing

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