

Preparation and characterization of PVA nanocomposites with bio-functionalized nanodiamonds

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Abstract:

Poly (vinyl alcohol) (PVA) has a long and successful history of applications in the biomedical and pharmaceutical area. At the forefront of multidisciplinary research in nanomedicine, carbon nanomaterials have demonstrated unprecedented potential for a variety of regenerative medicine applications. Nanodiamonds (NDs) are a unique class of carbon nanoparticles that are gaining increasing attention to their biocompatibility, highly functional surfaces, optical properties and intriguing physical properties. In this work, we have developed advanced PVA and NDs based nanocomposite membrane in a single step using a solution-casting method from an aqueous medium and achieved high dispersibility of NDs in the PVA matrix. The resulting nanocomposites have excellent properties derived from NDs and PVA. It has been found that thermal and mechanical properties increase dramatically with increasing NDs content, suggesting a strong chemical interaction between NDs and PVA. We assume that NDs will be a suitable nano-filler for PVA membranes. This work examines properties of PVA matrix reinforced with NDs particles and their potential application in biomedical field.

Key words:

Nanodiamonds, nanocomposites, membranes, poly (vinyl alcohol), TGA, DMA, DSC, SAXS/WAXS, SEM