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Abstract

Characterization of Hydrogels for Their Application in Tissue Regeneration †

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Abstract: Alterations in neurogenesis result in the inevitable loss of brain nervous tissue and cause neurodegenerative diseases, such as Parkinson's disease (PD), Alzheimer's disease (AD), and Huntington's disease (HD). In this regard, hydrogels based on natural biopolymers have attractive properties, such as excellent biocompatibility, a low immune response, and a significant similarity to the extracellular matrix (ECM) of tissues, thus supporting cell proliferation and migration. Human ECM is composed by relatively small amounts of fibrous, proteins, and polysaccharides. For example, scaffolds composed of gelatin and hyaluronic acid are highly abundant components in human ECM. The methacrylation of hyaluronic acid (HAMA) and gelatin (GelMA) through carboxyl and hydroxyl groups under UV light radiation at 365 nm produce polymeric scaffolds with elastic moduli similar to tissues, and, therefore, potential candidates to adhere, host, and facilitate cell proliferation and differentiation, which are dependent on their mechanical properties. In this work, the mechanical, thermal, and morphological properties of HAMA and GelMA hydrogel mixtures were studied and characterized via linear rheological measurements, thermogravimetric analysis (TGA), and scanning electron microscopy (SEM).

Keywords: hydrogel; HAMA; GelMA; rheological

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