

# Mapping the innovation landscape of peptide and protein hydrogels through patent analysis

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## Abstract

Peptide and protein hydrogels are innovative biomaterials that have garnered significant attention in biomedical applications. Both types of these hydrogels exhibit unique biological properties that make them suitable for various applications, particularly in tissue engineering and 3D bioprinting. Despite their advantages, issues such as stability, reproducibility, and clinical translation remain significant hurdles for the development and application of such hydrogels. Patent analysis can provide valuable insights into emerging technologies, trends, and opportunities for innovation in the field of development and application of hydrogels based on peptides and proteins. By examining patent data, researchers can identify white spaces and gain inspiration for novel solutions that address evolving hydrogel challenges. In this study, a patent analysis has been carried out to highlight the distribution of patent filings and technologies involved hydrogels. A comparison of data between peptide and protein hydrogels was then realized. With 2,608 peptide hydrogel patents, this field shows rapid growth in bioengineering and regenerative medicine, with significant international interest through the PCT system. Protein hydrogels, totaling 2,326 patents, focus on traditional biomedical applications, mainly in the US. The data reveals a higher diversity in patent types and classifications for hydrogels, underscoring their dynamic and innovative trajectory in hydrogel technology.

**Keywords:** peptide; protein; hydrogels; biomedical applications; innovation trends; patent analysis