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Hydrogels with Appropriate/Tunable Properties for Biomedical Applications

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Initially, hydrogels mainly attracted attention from biomaterial scientists due to their porosity, high water ratio, and soft consistency, which closely simulates natural living tissue. In addition to these features, more properties have been and are being developed to increase their potential for use in biomedical applications, including high mechanical strength, controllable degradation, bioadhesion properties, stimulation responsiveness, and so on.

Although much work has been done to endow hydrogels with different properties, it seems that excessive attention has been paid to increasing the 'intensity' of their different properties. Appropriate properties vary in importance based on the specific application. Moderate but not high adhesion strength for bioadhesive-based wound dressings will allow the re-change or re-exposure of wounds to occur more easily. For hydrogel scaffolds, a proper degradation speed that matches the tissue healing speed will lead to a better outcome. For applications in different tissues, hydrogels are needed with various mechanical strengths, rather than just high strength. Additionally, stretchable, light-responsive, and conductive hydrogels are appreciated in flexible and smart devices.

Fabricating hydrogels with appropriate/tunable properties is vital to expanding their applications in the biomedical field.

